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ART. XVIII.—OBSERVATIONS ON ARUM TRIPHYLLUM.

By DANIEL S. JONES.

(An Inaugural Essay.)

THE plants of the natural order Aroideæ, or Arum tribe, are all distinguished by a taste of burning acidity, which varies in different species. The most remarkable is the *Dieffenbachia Seguina*, or *Dumb Cane*, a native of the West Indies and South America, which possesses it in so great a degree as to be highly deleterious. When a small quantity of this plant is chewed it is said to cause intense pain, a swelling of the tongue, and suspension of the power of speech. According to Pereira, two drams of the recent juice have been known to prove fatal in two hours. Milder species, as the *Arum maculatum* and *A. triphyllum*, have been employed in medicine, and the latter has been placed in the secondary list of the United States Pharmacopœia.

Notwithstanding this acrid property is so marked in this family of plants, yet, so far as I have been able to learn, all attempts to isolate the principle or principles upon which it depends, or even to retain it, have proved unsatisfactory.

Dr. Bigelow, in his Medical Botany, has given a series of experiments on *Arum triphyllum*, tending to illustrate

its chemical constitution. He informs us that, after having macerated the recent root in all the menstrua ordinarily employed, as water, alcohol, ether and olive oil, without success, he submitted a portion connected with the leaves and stalks to the boiling temperature under water, when a small quantity of gas was obtained, which was thought to contain the active principle. This gas produced a cloudiness in lime water, and exploded on the application of a lighted taper.

Dr. Bigelow intimated an intention of resuming his researches, which he left in an incomplete state; but I have been unable to find any additional remarks from his pen.

The following observations are intended to illustrate this subject more fully; and it is believed that the care which has been extended to render them correct makes them worthy of confidence.

Four ounces of the recent and finely sliced root were placed under an inverted glass funnel, the neck of which was accurately stopped with a small glass jet having its point sealed. The funnel was entirely filled, and partially surrounded with recently boiled water, the temperature then raised to the boiling point, and the ebullition continued for two hours, until the root ceased to give off gaseous matter, and had entirely lost its acrimony. It was then suffered to cool. About two cubic inches of gas was obtained. It supported the respiration of an insect without apparent inconvenience to the animal; and a portion, when agitated with lime water, produced a slight opalescence; but the greater part remained unabsorbed: finally, when the gas was caused to issue from the jet by sinking the vessel in water, a lighted taper applied to it caused neither explosion nor inflammation.

To test the destructibility of the acrid principle by heat more decidedly, the following experiment was made. Into a large and strong glass tube, sealed at one end, a portion of

the sliced root was introduced, after which the tube was bent at an obtuse angle near the middle, and the other end hermetically sealed. The empty end of the tube was placed in a freezing mixture, and the other, containing the sliced root, heated gradually and regularly until all the moisture of the root had passed over to the refrigerated end of the tube. The whole was then permitted to acquire the temperature of the atmosphere, and the tube divided. The distilled fluid was found to possess the peculiar odor of the root, but *none* of its acrimony. The gaseous contents of the tube, when inhaled, caused no irritation, and was not inflammable. The root had been entirely deprived of its acrid burning taste.

It will be seen that the results of the above experiments do not accord with those of Dr. Bigelow, as the gaseous matter contained but a trace of carbonic acid, and was neither inflammable nor explosive.

Whether it is a product of the decomposition of the active principle, or whether it is atmospheric air absorbed by the root, and subsequently given out, has not been determined.

Liebig* states, at the end of his chapter on volatile oils containing sulphur, that "the volatile oil of the *Arum maculatum* belongs to this class;" and the same statement is made by Professor Graham; but I have been unable to find an account of this product, as no mention or reference is given by either of these authors: it must, however, be evident, that if such an oil exists in the *Arum triphyllum*, it should have been obtained in the tube experiment.

Quantitative examination of the principal ingredients of the root of Arum triphyllum.

Fecula.—One thousand grains of the root, previously washed, was rasped finely, agitated with water for some

* Organic Chemistry in Turner.

time, and then washed on a sieve until all the secula and soluble matter had been removed. The remaining fibrous substance, when dried at the temperature of 100° Fahr., weighed seventy-six grains. The washings and secula were then thrown on a filter, and the latter, after being well washed with water, and dried at 100° Fahr., weighed one hundred and seventy-one grains, or 17.1 per cent. The root used in this experiment was collected on the first of November, and rasped soon after being removed from the ground. The roots collected on the 7th of May yielded 10 per cent.; that obtained on the 8th of August, 11.3 per cent. It will thus be seen that, as the season progresses, the deposition of secula increases from 10 per cent. in May, to 17 per cent in November, when the top has entirely disappeared from the plant. The roots taken from plants growing in different situations present various aspects. As a general rule, those plants that are found in moist, shady situations, have larger tops and smaller roots than those which grow in open places; and the latter always contain the largest amount of secula. It has been observed, that when the plant is subjected to culture in a rich, somewhat elevated soil, fully exposed to the sun's influence, the root attains a much larger size, and yields a corresponding increased quantity of starch. It is also free from disease, which is apt to accompany the uncultivated, particularly when [growing in a very moist soil. This fact renders it probable that *Arum triphyllum* is susceptible, under proper treatment, of affording sufficient secula to render its cultivation profitable, with a view to supplying the market with arrow root. Dr. M'Call, of Georgia, in a note communicated to Dr. B. S. Barton, (Phil. Med. and Phys. Jour. vol. ii, p. 84,) states that he obtained 25 per cent. of secula from the root of this plant. As has been previously stated, the greatest yield in my hands has been 17 per cent. Doubtless the climate of Georgia may have had an influence in

the production of this constituent of the root, which is not exerted under our less favorable latitude.

The fecula of *Arum triphyllum* has a pure white color, without odor or taste. The granules, as ascertained by microscopical observation, are nearly spherical, transparent, and when compared as to size with the principal varieties of fecula, were found to approach most nearly that of wheat, yet they are even smaller on an average than the latter. This accounts satisfactorily for the absence of that crystalline lustrous aspect, so marked in some species of fecula, and which is a beautiful characteristic of the *tous les mois*.

The jelly formed by treating arum fecula with boiling water, when compared with that of Bermuda arrow root, was found to be equally free from taste or odor, and to possess even more consistency. When sweetened, etc., it affords a diet in all respects equal to that popular article, and might readily take its place.

Vegetable Albumen.—One thousand grains of the unpeeled root was rasped, and triturated with water until converted into a pulp, and then washed with the same fluid until completely deprived of soluble matter. The clear liquid, thus obtained, yielded precipitates with corrosive sublimate and ferrocyanuret of potassium. When its temperature was raised to 212° Fahr., a coagulum was formed which, when collected on a filter, washed with water, and dried at a temperature of 100° Fahr., weighed ten grains.

Gum.—Subacetate of lead was added to the filtered liquid remaining from the last operation, until it ceased to cause a precipitate; this was collected on a filter, washed with water, dried, and weighed. This precipitate amounted to 16.5 grains, representing 10.1 grains of gum.

After the separation of the gum in the last experiment, hydrosulphuric acid was passed through the clear liquid until the lead was precipitated, and then filtered, and evaporated to dryness. Thirty-two grains was thus obtained.

This extract was dissolved in half an ounce of water, and

half a dram of yeast added to the mixture; the whole was then placed in a small flask, and connected, by means of a tube, with an inverted jar over mercury. After the fermentation had ceased, a quantity of gas was found in the jar over the mercury, which was rapidly and entirely absorbed, when a piece of moist caustic potassa was introduced into it.

The residue, after fermentation, was distilled until one-sixth of its bulk had passed over into the receiver. This had an alcoholic odor, and on agitating it with carbonate of potassa to separate the water, the remaining fluid burned, on the application of a lighted taper, with a blue flame, and possessed other characteristics of alcohol. The capacity of the extract to yield alcohol and carbonic acid, by fermentation, is sufficient evidence of the existence of *sugar*.

One thousand grains of the dried root yielded, by incineration, a residue weighing forty-five grains, of which fifteen were soluble in boiling water. The solution thus obtained, effervesced with acids, possessed a strong alkaline reaction, and formed salts with nitric acid and bichloride of platinum, having the characters of nitrate of potassa and platino-bichloride of potassium. The residue left after treating the ashes with boiling water, was digested in nitric acid, diluted and filtered. Tested with oxalate of ammonia and ferrocyanuret of potassium, it gave evidence of the existence of *oxide of iron* and *lime*.

Seeds.—The fruit of the *Arum triphyllum* present several features of interest. The exterior or pericarp, when in a green state, possesses the acrimony of the plant in a concentrated degree, but as the season advances it becomes scarlet and pulpy, entirely loses its acrimony, and in this state affords a well relished food for many of the feathered tribe.

Within this pericarp are several hard seeds, consisting severally of a tough envelope enclosing a white amylaceous interior substance. This envelope of the seeds possesses the

property of communicating an intense red color to several alkaline solutions, particularly solution of ammonia, which bears a strong analogy to that of orceine and erythrine.

When the seeds, deprived of their pericarp, are macerated in solution of ammonia without contact of the atmosphere, no change takes place in their appearance; but if atmospheric air or oxygen be present, they soon become dark colored, and the solution gradually acquires an intense red hue. These are the precise conditions requisite for converting orceine, the crystalline substance existing in the *Lichen dealbata*, into orceine, the crimson coloring matter of Archil, in a pure state.

With these ideas in view, a portion of the bruised seeds was boiled in alcohol, the alcoholic liquid evaporated to dryness, and the product thus obtained treated with cold water until it ceased to be dissolved. The aqueous solution, thus obtained, was carefully evaporated to the proper consistence, and set aside. The fluid was gradually converted, by spontaneous evaporation, into a transparent varnish, without the slightest evidence of crystallization.

When this substance is dissolved in solution of ammonia and exposed to the air, the solution gradually assumes a deep red color. The addition of acetic acid to it, after removing the excess of ammonia by heat, precipitates the coloring matter in red flocks, which redissolve in an ammoniacal solution. It is also wholly precipitated by chloride of tin, nitrate of mercury, sulphate of zinc, acetate of lead, and chloride of barium, forming compounds having various shades of brown; sulphuric acid also precipitates it.

By suffering the deep red ammoniacal solution to evaporate, a dark colored extract-like matter is obtained, which is but partially soluble in water, to which it communicates a reddish brown tint, but is redissolved by solution of ammonia.

The seeds, when treated with a solution of carbonate of soda or caustic potassa, yield a similar coloring matter.

The coloring property resides only in the exterior envelope of the seeds, as their interior substance, or the pericarp enclosing them, do not possess it.

When an alcoholic tincture of the seeds is evaporated, a small quantity of yellow fixed oil separates.

In conclusion it may be observed, that the root of *Arum triphyllum* contains:

1. A peculiar, pungent, acrid principle, which resembles, in its leading characteristics, that contained in other species of the *Arum* genus, and which has not been isolated.
2. Fecula.
3. Vegetable Albumen.
4. Gum.
5. Sugar.
6. Extractive Matter.
7. Lignin.
8. Salts of Potassa and Lime.

To which should be added the substance contained in the seeds, which yield a deep red color with ammonia, and a yellow fixed oil, which they also contain.

ART. XIX.—PREPARATION OF CALOMEL IN A STATE OF MINUTE DIVISION.

BY M. SOUBEIRAN.

BOTH medical experience and chemical science tend to prove that the minute division of calomel adds to its medicinal energy. Porphyzation is not sufficient to effect this purpose, it affords a yellow powder, which is never sufficiently impalpable. Joseph Jewel was the first who discovered another method of pulverization. He proposed to conduct the vapour of calomel into a vessel containing water in a state of ebullition, and the steam from the latter, mixing with the vapour of the calomel, caused its speedy aggregation in the form of an impalpable and uniform powder.

If this process of Joseph Jewel's be not absolutely impracticable, it is at least very difficult to perform, hence all those who have attempted to apply this process, have soon given it up. In 1822, M. Henry, convinced from practical experience that he could never arrive at any satisfactory result by adhering strictly to Jewel's process, suggested a modification of the apparatus, which has been introduced into our laboratories, and is mentioned in most Pharmaceutical treatises. M. Henry's modification of the process consisted in having the steam generated in a separate vessel from that into which the vapour of the calomel is conducted. It is unnecessary to describe here the precautions which were necessary in conducting this process; it is sufficient to say, that those who have adopted this process, have found many practical difficulties, and not the least frequent has been the fracture of some of the vessels employed.

This process, notwithstanding its difficulties, being the only one employed in our laboratories, the practice has be-

come almost universal, in France, of employing this finely-divided calomel. It must be admitted, nevertheless, that in whiteness and fineness of division, the calomel prepared in France would not bear comparison with that imported from England.

In order to improve the product, and render the operation more easy, I proposed to substitute a current of air instead of steam, to effect the minute division of the calomel.

The apparatus consisted of an earthen tube placed across a furnace, in which the calomel in small lumps is heated. A current of air is passed continually through the tube by means of a centrifugal blowing-apparatus, so as to carry the vapour as it is formed into a receiver. If no obstacle be offered to the current, the calomel is in so fine a state of division, that it would be carried to a great distance; to obviate this, I found the best plan was, to make the tube terminate in a chamber divided into three stories by shelves running nearly across, and the communication from one to the other being at opposite sides of the chamber. The calomel was made to enter at the bottom of the chamber, while a pipe from the top, terminating in a vessel containing water, allowed the air to escape. This plan answered very well.

Numerous experiments, however, have induced me to relinquish this process in favor of another more simple, and in every respect satisfactory.

I now employ neither steam nor a current of air: my apparatus is composed simply of a tube and a receiver; and I obtain the calomel, in the finest state of division and of beautiful appearance, by a single operation. The principle of this operation is similar to that of the process for the manufacture of flowers of sulphur.

The vessels in which I heat the calomel are earthen tubes, about four inches in diameter and eighteen inches long. These are closed at one end and open at the other, and each

tube contains from ten to fourteen pounds troy of calomel. The tubes which I use have been made with the clay employed in the manufacture of Paris crucibles. I have gone to the pains of having them coated on the outside with a layer of another kind of clay. By this means they so far resist the action of the fire as to admit of being used several times.

The tube containing the calomel is placed in a furnace, the form of which is adapted to it, the open extremity of the tube protruding through an aperture made for that purpose, and communicating with a receiver. The receiver which I have hitherto employed is a large stone vase, with a hole pierced in the side to receive the open end of the tube. A small opening at the top, over which a plate of glass is laid, serves to allow of the escape of the diluted air.

Instead of this vessel, a small chamber may be built of brick-work attached to the furnace; but for operating on a few pounds, I prefer to use the vessel I have described.

The receiver ought to be placed as near as possible to the furnace, to prevent the calomel from condensing in the end of the tube. On the other hand, the receiver should be protected from the heat of the furnace: to effect this, the opening, at which the tube issues from the furnace, should be luted with clay, and two polished plates of metal should be placed between the furnace and the receiver to prevent the radiation of heat. Thus are accomplished the two conditions essential to success; the tube is heated to within a very short distance of its entrance into the receiver, by which means the calomel is prevented from condensing in the tube; and the receiver is preserved from the heat of the furnace, which, by raising the temperature of the air too high, would cause the calomel to be deposited in crystallized agglomerations instead of a finely-divided powder.

Nothing is more simple than the management of the fire.

The tube is heated to dull redness at that part nearest to the receiver, then the fire is extended by degrees along its whole length. An hour and a half or two hours is sufficient to complete the sublimation of twelve or fourteen pounds of calomel.

When the operation is considered to be finished, the apparatus is unluted, and the calomel is washed with distilled water until the water ceases to be colored by sulphuretted hydrogen. The calomel is afterwards dried by a very gentle heat.

Such is the very simple method of operating to which I have arrived, and I feel confident it is that which is kept secret by the manufacturers in England, for the calomel produced will bear comparison with the very best that is imported from that country. This is a triumph acquired to our commerce.

I am now occupied in applying this process to the division of other volatile mineral substances, and have already effected its application to some. The operation presents difficulties in the cases of orpiment and cinnabar, arising from these substances requiring the contact of air at a high temperature.

Pharm. Journ., from Journal de Pharmacie.

ART. XX.—ON THE PREPARATION OF ENGLISH
CALOMEL.

BY M. CALVERT.

THE importance of being able to manufacture, in France, a calomel as good and as cheap as that which is imported from England, renders it a matter of interest to know the exact process adopted by the London manufacturers. It must be observed, however, that the following details are merely given as a supplement to the very ingenious paper on the preparation of calomel, by M. Soubeiran. This Chemist has in fact discovered the basis of the English process, his method of operating differing only in the nature of the apparatus employed. The material principle is the same in both cases, namely, the employment of a chamber into which the vapour of the calomel is conducted, sufficiently large for the air contained in it to hold the particles of calomel in suspension during the condensation of the vapour, and thus to prevent its crystallization.

The apparatus employed in England consists of an iron cylinder about thirty inches long and twelve inches diameter, closed at one end by a kind of door in the same way as the cylinders employed in the manufacture of hydrochloric acid. It is at this end that the materials used in making the calomel are introduced. The other end of the cylinder has a neck or contraction, six inches long and six inches in diameter. This neck is made large, so that it may not get stopped up by the condensation of the calomel. The neck of the cylinder penetrates the side of a bricked chamber, lined on the inside with flag-stones. This chamber is about six feet six inches high, and four feet six inches wide; the bottom is a little sloped, and in one of the sides is a door

for removing the product of each operation. Lastly, the cylinder is set in a furnace in such a manner that the flame entirely envelopes it.

The calomel is introduced into the cylinder, and a small quantity of corrosive sublimate is added, to supply chlorine to a portion of mercury, which appears to result from the partial reduction of the protochloride. But it is found that this decomposition may be almost entirely prevented, if, instead of using calomel, the substances from which it is produced be employed, mixed in the proper proportions. The calomel thus obtained is so pure, that it merely requires to be once washed.

I could not believe for some time that an iron cylinder could be used, for it appeared to me that this metal would cause a decomposition of the protochloride of mercury, the iron being converted into perchloride with the chlorine of a part of the calomel, and this would be volatilized with the remaining calomel and the mercury, thus injuring the beauty and purity of the product; but on further reflection it appears that this change could hardly take place at a temperature so high as that which is necessary for working an apparatus containing many pounds of the materials for producing calomel.—*Ibid.*

ART. XX.—ON GRAINS OF PARADISE.

BY JONATHAN PEREIRA, M.D., F.R.S. & L.S.

IN a preceding paper* I have shown, that in the east the name of Grain of Paradise is applied to the Ceylon cardamom; and, thinking it probable that other scitamineous fruits may have probably borne the same name, I have been led to make some investigations on the subject, the results of which are subjoined.

I endeavored, in the first instance, to ascertain what circumstances led to the application of the name "Grain of Paradise," to the fruit or seeds of a scitamineous plant, but have not found authors agreed on this point. Marmot, quoted by Barbot,† says, "that before the coming of the Portuguese to this coast of Malaguetta, the merchants of Barbary repaired thither to fetch off this pepper [Malaguetta pepper;] traversing the whole kingdom of Mandinga in Nigritia, and the country commonly called Guinea, *i. e.*, Genehoa and the Lybian Deserts; and from Barbary some quantity of that spice was transported into Italy, where it was called Grains of Paradise, because its origin was unknown there." But Valentini‡ says, that the seeds, "*vel propter pulchritudinem, aut odorem valde gratum, quem recentia spargunt, grana Paradisi vocata.*"

I find that the term, Grains of Paradise, has been applied to the produce of no less than six scitamineous plants; and there is a seventh fruit which may have at times, perhaps, borne the same name.

1. The *Melligetta*, *Grana Paradisi*, or *Cardamomum*

* Pharmaceutica] Transactions, vol. ii., p. 381.

† Churchill's Collection of Voyages and Travels, vol. v., p. 138. Lond. 1732.

‡ Historia Simplicium reformata. Francof. 1716.

piperatum of Valerius Cordus,* appears to be identical with the hot acrid seeds now known as Grains of Paradise, and which were exclusively brought from Guinea, whence their name of *Guinea grains*. They are the produce of *Amomum Grana Paradisi*, Smith.† Cordus states, that the fruit resembles an egg in shape and size, and that the seeds have a hot flavor like that of pepper and ginger. These characters leave no doubt as to the identity of his Melligetia with our Grains of Paradise.

2. The *Cardamomum majus* of Cordus has been confounded by many writers with his Melligetia. He appears to have been well aware of the error, for he observes, "Errant quotque dicunt, Melligettam, majus Cardamomum esse. Cardamomis enim tenuis minimeque servens sed gratus ac jucundus est sapor, Melligettæ vero piperis instar acerrimus." This cardamom is the produce of *Amomum angustifolium*, Sonnerat‡ and Smith,§ the *A. madagascariense* of Lamarck.|| It can scarcely be doubted, therefore, that Linnæus¶ and other botanists, who give Madagascar as one of the habitats of the Grain of Paradise plant, have confounded the Guinea plant (*Amomum Grana paradisi*, Smith) with that of Madagascar (*A. angustifolium*, Sonnerat;) for the Grains of Paradise of commerce are always brought from Guinea. Some very fine samples of the Madagascar cardamom (*Cardamomum majus*, Cordus,) are contained in Dr. Burgess's collection of *Materia Medica* at the College of Physicians. One of these I have figured in my "*Elements of Materia Medica*," vol. ii., under the

* *Historia Stirpium*, lib. iv., p. 195. 1561.

† Rees' *Cyclopædia*, vol. xxiii., art. *Mellegetta*; also vol. xxxix., art. *Amomum*. Roscoe (*Monandrian Plants*;) declares, that his *Amomum Melegueta*, which he considers to be a distinct species, yields the Melegueta pepper of the shops.

‡ *Voyage aux Indes*, t. ii., p. 242.

§ Rees' *Cyclopædia*, vol. xxxix., art. *Amomum*.

|| *Encyclopédie Methodique*, div. *Botanique*.

¶ *Species Plantarum*. Holmiæ. 1753.

name of the *Madagascar cardamom*. I have recently received specimens of this fruit under the name of *Cardamoms from Abyssinia*, from Professor Royle. The seeds have an agreeable aromatic flavor, and are totally devoid of that excessively hot acrid taste which is so characteristic of the Melligetta pepper, or Grains of Paradise brought from Guinea.

3. Gärtner* has figured the fruit and seeds of a scitamineous plant under the name of *Zingiber Melægueta*, and which he considered to be identical with the Grains of Paradise. The seeds, however, are readily distinguished from the real Grains of Paradise by their leaden color, and their slightly aromatic flavor. Several capsules, in very good preservation, are contained in the Sloanian collection of fruits in the British Museum. According to Sir James Edward Smith,† the plant which yields them is a native of Sierra Leone, and is called by the natives *maboobo*. He terms it *Amomum macrospermum*, or the *large-seeded Guinea amomum*.

4. There is occasionally imported into this country a scitamineous fruit known by the name of the *Java cardamom*. It is the *Cardamome fausse maniguette* of Guibourt.‡ My friend, Dr. Royle, informs me that at Saharunpore it is called *Bura Elachee*, or *great cardamom*, while in the Calcutta market it is known as the *Bengal cardamom*. Ainslie§ calls its seeds *greater seeds of cardamoms*, and gives as synonymes *Burrie Eelatchy*, and *Desi Elachi* (*country cardamoms*.) The former of these terms agrees with that assigned to these fruits by my friend, Dr. Royle. Ainslie appears to consider these seeds as identical with Grains of Paradise, and accordingly refers them to the

* De fructibus et seminibus plantarum.

† Rees' Cyclopædia, vol. xxxix.

‡ Hist. des Drogues.

§ Materia Indica, vol. i. p. 54, 5.

Amomum Granum Paradisi. But I have elsewhere* shown it to be the produce of *Amomum maximum*, Roxburgh, a native of Java,† and which is cultivated at Nepal.‡ Hence the fruit is sometimes called *Java cardamoms*, or *Nepal cardamoms*. I have recently received from my former pupil, Mr. Thomas Brydon, now of the firm of Bruce & Co., of Madras, five samples of this same fruit, procured from a dealer. They varied somewhat in size, and bore the following names supplied by the native dealer:

1. "Large sized cardamoms.—Not known where from.—Used as Medicine."
2. "Segoor Jungle cardamoms.—Medicinal."
3. "Cardamoms collected on the Malabar Coast.—Medicinal."
4. "Round Cochin cardamoms.—Medicinal."
5. "Odd or spare cardamoms.—Not known.—Used as Medicine."

If the capsule be soaked in hot water, from nine to thirteen membranous wings become apparent, and which distinguish this from every other kind of cardamom which I have hitherto met with in commerce. The seeds are feebly aromatic.

5. I have already shown§ that *Ceylon cardamoms* (*Elettaria major*, Smith) have been confounded with Grains of Paradise (*Amomum Granum Paradisi*, Smith.) The substitution of the one for the other was known to Dale,|| who observes of the *Ceylon cardamoms*, that "rarius in nostris officinis inveniuntur; alii enim Grana Paradisi officinis dicta seu Meleguetam, non sine errore, alii *Amomum verum* *Ger. horum loco substituunt*." And Lewis,¶ in

* Elements of Materia Medica, vol. ii., p. 1028. 2d edit.

† Blume, *Enum. Plant. Javæ*.

‡ Hamilton (Buchanan,) Account of the Kingdom of Nepal.

§ Pharmaceutical Transactions, vol. ii., p. 384.

|| Pharmacologia, p. 252. 3rd ed. 1737.

¶ An Experimental History of the Materia Medica, p. 177. London. 1761.

speaking of the Ceylon cardamom, which he calls "*Cardamomum medium*," observes, that "there is some confusion in regard to the name; that of *Cardamomum majus* being applied among us to this species, and in France to the *Grana paradisi*."

6. Burmann* refers Grains of Paradise to his "*Cardamomum Zeylanicum fructu rotundo nigro*," and which I presume is the *Alpinia Allughas* of Roscoe. But the greatest confusion exists in Burmann's work, with regard to the synonymes of cardamoms and grains of paradise. He confounds no less than five or six distinct fruits with his round black Ceylon cardamom.

7. The last scitamineous fruit which I have to notice is a very rare one, and I shall distinguish it by the name of *Clusius's cardamom*, because I believe it to have been first described by Clusius,† who observes, that although it has some resemblance to Melegueta, yet if the two fruits be carefully compared the difference is very obvious; and he then proceeds to point out the distinctions between them. Its origin was unknown; it was collected by an apothecary, who died on his voyage, without leaving any memorandum respecting it. More than two hundred years afterwards a second specimen of the same fruit was accidentally found in a druggist's shop, by Sir James Edward Smith,‡ who has described it under the name of *Amomum Clusii*. He thinks it was met with in a chest of great cardamoms (Madagascar cardamoms.) A third specimen was given me by a druggist a few years since.§ These are all the known specimens which have been met with. The capsule might be confounded by superficial observers with either Mellegetta or the Madagascar cardamom; but the seeds at once

* Thesaurus Zeylanicus, p. 54.

† Exoticorum, lib. ii., cap. xv. 1605.

‡ Rees' Cyclopædia, vol. xxxix.

§ Lucae, of Berlin, to whom I showed this fruit, told me he had before met with a specimen under the name of *Melaleuca Cajaputi*.

distinguish it. They are totally devoid of the acrid hot taste of the *Mellegetta*; are not at all angular, but oblong or ovate, slightly inclining to cylindrical, and are so highly polished that they appear as if varnished.

These seven scitamineous fruits thus briefly noticed, are, as far as I have been able to ascertain, the only ones to which the name of *Mellegetta*, or *Grain of Paradise* has been applied. At the present day, in England, this name is used to indicate the hot acrid seeds brought from the coast of Guinea (hence called *Guinea Grains*) and produced by the *Amomum Granum Paradisi* of Sir J. E. Smith. A very erroneous notion has long prevailed that they are poisonous; and, as they are employed principally to give a pungent flavor to spirituous liquors, &c., the very heavy duty of two shillings per pound was imposed on them, and which was intended to act as a prohibition to their use. I see, however, that by the new tariff, introduced by Sir Robert Peel, the duty is lowered to fifteen shillings per cwt.

Pharm. Journ. and Transactions.

ART. XX.—AN EFFORT TO REFUTE THE ARGUMENTS
ADVANCED IN FAVOR OF THE EXISTENCE, IN THE
AMPHIDE SALTS,* OF RADICALS, CONSISTING, LIKE
CYANOGEN, OF MORE THAN ONE ELEMENT.

BY ROBERT HARE, M. D.

Professor of Chemistry in the University of Pennsylvania.

*The following is a Summary of the Opinions which
it is the Object of the subsequent Reasoning to Jus-
tify.*

(a) The community of effect, as respects the extrication of hydrogen by contact of certain metals with aqueous solutions of sulphuric and chlorohydric acid, is not an adequate ground for an inferred analogy of composition, since it must inevitably arise that any radical will, from any compound, displace any other radical, when the forces favoring its substitution preponderate over the quiescent affinities.

(b) But if, nevertheless, it be held that the evolution of hydrogen from any combination, by contact with a metal, is a sufficient proof of the existence of a halogen† body, simple or compound, in the combination, the evolution of hydrogen from water, by the contact with any metal of the alkalies, must prove oxygen to be a halogen body; also the evolution of hydrogen from sulphydric, selenhydric, or tellurhydric acids, by similar means, would justify an inference

* An amphide salt is one consisting of an acid and a base, each containing an amphigen body, either oxygen, sulphur, selenium, or tellurium, as its electro-negative ingredient.

† The epithet halogen is applied to bodies whose binary compounds with metals are deemed salts, and which are consequently called haloid salts.

that sulphur, selenium, or tellurium, as well as oxygen, belong to the halogen or salt radical class:—

(c) The amphigen bodies being thus proved to belong to the halogen class, oxides, sulphides, selenides, and tellurides, would be haloid salts, and their compounds double salts; instead of consisting of a compound radical and a metal:—

(d) The argument in favor of similarity of composition in the haloid and amphide salts, founded on a limited resemblance of properties in some instances, is more than counterbalanced by an extreme dissimilitude in many others:—

(e) As, in either class, almost every property may be found which is observed in any chemical compound, the existence of a similitude, in some cases, might be naturally expected:—

(f) As it is evident that many salts, perfectly analogous in composition, are extremely dissimilar in properties, it is not reasonable to consider resemblance in properties, as a proof of analogy in composition:—

(g) No line of distinction, as respects either properties or composition, can be drawn between the binary compounds of the amphigen and halogen bodies, which justifies that separate classification which the doctrine requires; so that it must be untenable as respects the one, or be extended to the other:—

(h) The great diversity, both as respects properties and composition of the bodies called salts, rendering it impossible to define the meaning of the word, any attempt to vary the language and theory of Chemistry, in reference to the idea of a salt, must be injudicious:—

(i) There is at least as much mystery in the fact, that the addition of an atom of oxygen to an oxacid, should confer an affinity for a simple radical, as that the addition of an atom of oxygen to such a radical, should create an affinity between it and an oxacid:—

(j) If one atom of oxygen confer upon the base into which it enters, the power to combine with one atom of acid, it is quite consistent that the affinity thus conferred should be augmented, proportionably, by a further accession of oxygen:—

(k) It were quite as anomalous, mysterious, and improbable, that there should be three oxyphosphions, severally requiring for saturation one, two, and three atoms of hydrogen, as that three isomeric states of phosphoric acid should exist, requiring as many different equivalents of basic water:—*

(l) The attributes of acidity alleged to be due altogether to the presence of basic water, are not seen in hydrated acids, when holding water in that form only; nor in such as are, like the oily acids, incapable of uniting with water as a solvent. Further, these attributes are admitted to belong to salts which, not holding water as a base, cannot be hydrurets or hydracids of any salt radical: and while such attributes are found in compounds which, like chromic, or carbonic acid, cannot be considered as hydrurets, they do not exist in all that merit this appellation, as is evident in the cases of prussic acid, or oil of bitter almonds:—

(m) It seems to have escaped attention, that if SO^4 be the oxysulphion of sulphates, SO^3 , anhydrous sulphuric acid, must be the oxysulphion of the sulphites; and that there must, in the hyposulphites and hyposulphates, be two other oxysulphions!—

(n) The electrolytic experiments of Daniell have been erroneously interpreted, since the electrolysis of the base of sulphate of soda would so cause the separation of sodium and oxygen, that the oxygen would be attracted to the anode, the hydrogen and soda being *indirectly* evolved by the reaction of sodium with water; while the acid, deprived of its alkaline base, would be found at the anode in combi-

* See Kane's Chemistry.

nation with basic water, without having been made to act in the capacity of an anion.

(o) The copper in the case of a solution of the sulphate of this metal and a solution of potash, separated by a membrane, would, by electrolyzation, be evolved by the same process as sodium, so long as there should be copper to perform the office of a cation; and when there should no longer be any copper to act in this capacity, the metal of the alkali, or hydrogen of water, on the other side of the membrane, would act as a cation; the oxygen acting as an anion from one electrode to the other, first to the copper, and then to the potassium:—

(p) The allegation that the copper was deposited from the want of an anion (oxysulphion) to combine with, is manifestly an error, since, had there been no anion, there could have been no discharge, as alleged, to hydrogen as a cation, nor any electrolysis:—

(q) The hydrated oxide precipitated on the membrane came from the reaction of the alkali with the sulphate of copper; the precipitated oxide of this metal from the oxygen of the soda acting as an anion; and the deposit of metallic copper from the solutions performing, feebly, the part of electrodes, while themselves the subjects of electrolyzation:—

(r) The so called principles of Liebig,* by which his theory of organic acids is preceded, are mainly an inversion of the truth, since they make the capacity of saturation of hydrated acids dependent on the quantity of hydrogen in their basic water, instead of making both the quantity of water, and, of course, the quantity of hydrogen therein, depend on their capacity:—

(s) All that is truly said of hydrogen would be equally true of any other radical, while the language employed

* *Traité de Chymie Organique*, tom. 1, page 7.

would lead the student to suppose that there is a peculiar association between capacity of saturation, and presence of hydrogen.

AN EFFORT, &c. &c.

1. Some of the most distinguished European chemists, encouraged by the number of instances in which the existence of hypothetical radicals has been rendered probable, have lately inferred that such radicals are essential to the constitution of a most important class of bodies heretofore considered as compounds of acids and bases. It has been inferred, for instance, that sulphur, with four atoms of oxygen, (SO^4) constitutes a compound radical, which is analogous in habitudes and composition to cyanogen, performing in hydrous sulphuric acid, the same part as chlorine in chlorohydric acid.

2. Graham has proposed sulphatoxygen as a name for this radical, and sulphatoxide for any of its compounds. Daniell has proposed oxysulphion and oxysulphionide for the same purposes. As either nomenclature is evidently liable to the same objections, it will be sufficient to cite the terms suggested by one of these authors in reasoning against their adoption.

3. Consistently with the language suggested by Daniell, hydrous sulphuric acid, constituted of one atom of acid and one of basic water, ($\text{SO}^3 + \text{HO}$) is a compound of oxysulphion and hydrogen ($\text{SO}^4 + \text{H}$.) Nitric acid ($\text{NO}^5 + \text{HO}$) is a compound of oxynitron and hydrogen ($\text{NO}^6 + \text{H}$.) In like manner we should have oxyphosphion in phosphoric acid, oxyarsenion in arsenic acid, and in all acids, hitherto called hydrated, whether organic or inorganic, we should have radicals designated by names made after the same plan. Their salts having corresponding appellations, would

be oxysulphonide, oxynitronides, &c. Also, in any salts in which any other of the amphigen class of Berzelius is the electro-negative ingredient, whether sulphur, selenium, or tellurium, all the ingredients excepting the electro-positive radical, would be considered as constituting a compound electro-negative radical.*

4. It may be expedient to take this opportunity of mentioning, that the advocates of this new view, disadvantageously as I think, employ the word radical, to designate the electro-negative, as well as the electro-positive ingre-

* The conception of the existence of salt radicals seems to have originated with Davy. It was suggested by Berzelius, in his letter in reply to some strictures which I published on his Nomenclature, in the following language:—

“If, for instance, the true electro-chemical composition of the sulphate of potash should not be $\text{KO} + \text{SO}^3$, as is generally supposed, but $\text{K} + \text{SO}^4$, and it appears very natural that atoms, so eminently electro-negative as sulphur and oxygen, should be associated, we have, in the salt in question, potassium combined with a compound body, which, like cyanogen in $\text{K} + \text{C}^2\text{N}$, imitates simple halogen bodies, and gives a salt with potassium and other metals. The hydrated oxacids, agreeably to this view, would be then hydracids of a compound halogen body, from which metals may displace hydrogen, as in the hydracids of simple halogen bodies. Thus we know that SO^3 , that is to say, anhydrous sulphuric acid, is a body, whose properties, as respects acidity, differ from those which we should expect in the active principle of hydrous sulphuric acid.

“The difference between the oxysalts and the halosalts is very easily illustrated by formulæ. In KFF (fluoride of potassium,) there is but one single line of substitution, that is to say, that of K|FF ; whilst in KOOOOS (sulphate of potash) there are two, K|OOOOS and KO!OOOS , of which we use the first in replacing one metal by another, for instance, copper by iron; and the second in replacing one oxide by another.

“I do not know what value you may attach to this development of the constitution of the oxysalts (which applies equally to the sulphosalts and others;) but as to myself, I have a thorough conviction that there is therein something more than a vague speculation, since it unfolds to us an internal analogy in phenomena, which, agreeably to the perception of our senses, are extremely analogous.”

dient. Agreeably to the nomenclature of Berzelius, the former would be a compound halogen body. Cyanogen being analogous, is by him placed in the halogen class. I shall, therefore, in speaking of "*salt radicals*," improperly so called, employ the appellation contrived by the great Swedish chemist.

5. It seems to be conceded, that however plausible may be the reasons for inferring the existence of halogen bodies in the amphide salts, it would be inexpedient to make a corresponding change in nomenclature, on account of the great inconvenience which must arise from the consequent change of names. Under these circumstances, it may be well to consider how far there is any necessity for adopting hypothetical views, to which it would be so disadvantageous to accommodate the received language of chemists. In the strictures on the Berzelian nomenclature, which drew from Berzelius the suggestions contained in the quotation at the foot of the preceding page, I stated it to be my impression that water should be considered as acting in some cases as an oxybase, in others as an oxacid; and, in my examination of his reply,* I observed that *hydrous sulphuric acid might be considered as a sulphate of hydrogen, and that when this acid reacts with zinc or iron, the proneness of hydrogen to the aëriform state enables either metal to take its place, agreeably to the established laws of affinity.*

6. There appears to have been a coincidence of opinion between Kane, Graham, Gregory, and myself, as respects the electro-positive relation of hydrogen to the amphigen and halogen elements, which I have designated collectively as the basacigen class; also in the impression that hydrogen acts like a metallic radical, its oxide, water, performing the part of a base. I agree perfectly with Gregory in considering that hydrated acids may be considered as "*hydrogen*

* Silliman's Journal, Vol. 27, for 1835, page 61.

salts." But when the learned editor proceeds to allege that "*acids and salts, as respects their constitution, will form one class,*" I consider him, and those who sanction this allegation, as founding an error upon an oversight. Because the salts of hydrogen, or such as have water for their base, have heretofore been erroneously called acids, we are henceforth to confound salts with acids, and, instead of correcting one wrong name, cause all others to conform thereto!

7. I fully concur with Gregory and Kane, in considering that water in hydrous sulphuric acid, in nitric acid, chloric acid, and in organic acids, generally acts as a base; also, that in this basic water hydrogen performs a part perfectly analogous to that of a metallic radical; but, agreeably to this view, I cannot perceive any difficulty in accounting for the evolution of hydrogen, as suggested in the quotation above made (6,) agreeably to which, when diluted sulphuric acid reacts with zinc or iron, the liberation of hydrogen results from the superiority of the forces which tend to insert either of these metals in the place occupied by the hydrogen, over those which tend to retain it in statu quo.

8. When oxide of copper is presented to chlorohydric acid, it is inferred that the hydrogen unites with oxygen, and the chlorine with the metal; and hence it seems to be presumed, that when oxide of copper is combined with sulphuric acid, a similar play of affinities should ensue: but would it be reasonable to make this a ground for assuming the existence of a compound radical, when the phenomena admit of another explanation quite as simple and consistent with the laws of chemical affinity?

9. Whether hydrogen be replaced by zinc, or oxide of hydrogen by oxide of copper, cannot make any material difference. In the one case, a radical expels another radical, and takes its place; in the other, a base expels another base, and takes its place.

10. There can be no difficulty, then, in understanding

wherefore, from the compound of sulphur and three atoms of oxygen, and an atom of basic water, hydrogen should be expelled and replaced by zinc, or that water should be expelled and replaced by oxide of copper; the only mystery is in the fact, that SO_3 , as anhydrous sulphuric acid, will not combine with hydrogen, copper, or any other radical, unless oxydized. But this mystery equally exists on assuming that an additional atom of oxygen converts SO_3 into oxysulphion, endowed with an energetic affinity for metallic radicals, to which SO_3 is quite indifferent.

11. In either case an inexplicable mystery exists; but it is, in the one case, associated with an hypothetical change, in the other, with one which is known to take place.

12. But if hydrous sulphuric acid is to be assumed to be a hydruret of a compound halogen body (*oxysulphion*,) because it evolves hydrogen on contact with zinc, wherefore is not water, which evolves hydrogen on contact with potassium, sodium, barium, strontium, or calcium, to be considered as a hydruret of oxygen, making oxygen a halogen body?

13. Boldly begging the question, Graham reasons thus: "*the chlorides themselves being salts, their compounds must be double salts.*"

14. But if the chlorides are salts, the chloride of hydrogen is a salt; and if so, wherefore is not the oxide of hydrogen a salt, which, in its susceptibility of the crystalline form, has a salt attribute which the æriform chloride does not possess?

15. Further, if the oxide of hydrogen be a salt, every oxide is a salt, as well as every chloride. Now, controverting the argument above quoted, by analogous reasoning, it may be said, "*the oxides themselves being salts, their compounds are double salts.*" Of course sulphate of potash is not a sulphatoxide, as Graham's ingenious nomenclature would make it, but must be a double salt, since it consists of two oxides in "themselves salts."

16. I trust that sufficient reasons have been adduced, to make it evident that the common result of the extrication of hydrogen, during the reaction of zinc or iron with sulphuric or chlorohydric acid, is not a competent ground for assuming that there are, in amphide salts, "compound radicals" playing the same part as halogen bodies.

17. Let us, in the next place, consider the argument in favor of the existence of such radicals, founded on the similitude of the haloid and amphide salts, which is stated by Dr. Kane in the following words:—

"It had long been remarked as curious, that bodies so different in composition as the compound of chlorine with a metal, on one hand, and of an oxygen acid with the oxide of the metal on the other, should be so similar in properties that both must be classed as salts, and should give rise to a series of basic and acid compounds for the most part completely parallel."—*Elements*, p. 681.

18. Upon the *similitude* and *complete parallelism* of the amphide and haloid salts, thus erroneously alleged, the author proceeds to argue in favor of the existence in the former, of compound halogen bodies, analogous in their mode of combination to chlorine or iodine.

19. I presume it will be granted, that if similitude in properties be a sufficient ground for inferring an analogy in composition, dissimilitude ought to justify an opposite inference. And that if, as the author alleges, certain bodies have been classed as salts, on account of their similarity in this respect, when dissimilar they ought not to be so classed. Under this view of the question, I propose to examine how far any similitude in properties exists between the bodies designated as salts by the author or any other chemist.

20. The salts, hitherto considered as compounds of acids and bases, are by Berzelius called amphide salts, being produced severally by the union of one or other of his amphigen class, comprising oxygen, sulphur, selenium, and tellurium, with two radicals, with one of which an acid is

formed, with the other a base. The binary compounds of his halogen class, comprising chlorine, bromine, iodine, fluorine and cyanogen, are called by him haloid salts. I shall use the names thus suggested.

21. Among the haloid salts we have common salt and Derbyshire spar; the gaseous fluorides and chlorides of hydrogen, silicon or boron; the fuming liquor of Libavius; the acrid butyraceous chlorides of zinc, bismuth and antimony; the volatile chlorides of magnesium, iron, chromium, and mercury, and the fixed chlorides of calcium, barium, strontium, silver and lead; the volatile poison prussic acid, and solid poisonous bicyanide of mercury, with various inert cyanides like those of Prussian blue: likewise a great number of etherial compounds.

22. Among the amphide salts are the very soluble sulphates of zinc, iron, copper, soda, magnesia, &c., and the insoluble stony sulphates of baryta and strontia; also ceruse and sugar of lead; alabaster, marble, soaps, ethers, and innumerable stony silicates, and aluminates. Last, but not among the least discordant, are the hydrated acids and alkaline and earthy hydrates.

23. When the various sets of bodies, above enumerated as comprised in the two classes under consideration, are contemplated, is it not evident that, not only between several sets of haloid and amphide salts, but also between several sets in either class, there is an extreme discordancy in properties: so that making properties the test would involve not only that various sets in one class could not be coupled with certain sets in the other, but, also, that in neither class could any one set be selected as exemplifying the characteristics of a salt, without depriving a majority of those similarly constituted, of all pretensions to the saline character?

24. Now, if among the bodies above enumerated, some pairs of amphide and haloid salts can be selected, which make a tolerable match with respect to their properties, as

in the case of sulphate of soda, and chloride of sodium, while in other cases there is the greatest discordancy, (as in the stony silicate felspar, and the gaseous fluoride fluosilicic acid gas; as in soap and Derbyshire spar; as in marble and the fuming liquor of Libavius, the sour protochloride of tin, and sweet acetate of lead,) is it reasonable to found an argument in favor of a hypothetical similitude in composition, on the *resemblance* of the two classes in properties? Does not the *extreme* dissimilitude in some cases, more than countervail the limited resemblance in others? And when the great variety of properties displayed both by the amphide and haloid salts is considered, is it a cause for wonder or perplexity, that in some instances, amphide salts should be found to resemble those of the other kind?

25. Again, admitting that there was any cause for perplexity agreeably to the old doctrine, is there less, agreeably to that which is now recommended? Is there no ground for wonder that oxygen or sulphur cannot act as simple halogen bodies? By what rule are their binary compounds to be excluded from the class of haloid salts? Wherefore should chlorides, bromides, iodides, and fluorides, however antisaline in their properties, be considered as salts, while in no case is an oxide, a sulphide, selenide or telluride to be deemed worthy of that name?

26. I challenge any chemist to assign any good reason wherefore the red iodide of mercury is any more a salt than the red oxide, or the protochloride is more saline than the sulphide: or why the volatile oxides of osmium or of arsenic are less saline than horn silver or horn lead; or the volatile chloride of arsenic, than the comparatively fixed sulphides of the same metal: why gaseous chlorohydric acid is more saline than steam or gaseous oxhydric acid, as aqueous vapor may be designated without any inconsistency.

27. It much surprises me, that when so much stress is laid upon the idea of a salt, the impossibility of defining the meaning of the word escapes attention. How is a salt to be

distinguished from any other binary compound? When the discordant group of substances which have been enumerated under this name is contemplated, is it not evident that no definition of them can be founded on community of properties; and by the advocates of the new doctrine, composition has been made the object of definition, instead of being the basis; thus, agreeably to them, a compound is not a salt, because it is made of certain elements; but, on the contrary, an element, whether simple or compound, belongs to the class of salt radicals, because it produces a salt. Since sulphur, with four atoms of oxygen, SO_4 , produces a salt with a metal, it must be deemed a salt radical.

28. In proof that the double chlorides are not united in a way to justify the opinion adopted by Bonsdorff, Thomson, myself, and others, it is alleged by Graham, "*that in such compounds the characters of the constituent salts are very little affected by their state of union.*"

29. This allegation being, in the next page, admitted to be inapplicable in the case of the double cyanides; an effort is made to get over this obstacle, by suggesting the existence of another compound radical. But the allegation of the author is erroneous as respects various double haloid salts, especially the fluosilicates, the fluoborates, fluozirconiates, the chloroplatinates, chloroiridates, chloroosmicates, chloropalladiates, &c., all of them compounds in which the constituent fluorides and chlorides exist in a state of energetic combination by which they are materially altered as to their state of existence.

30. Evidently the word salt has been so used, or rather so abused, that it is impossible to define it, either by a resort to properties or composition; and I conceive, therefore, that to make it a ground of abandoning terms which are susceptible of definition, and which have long been tacitly used by chemists in general, in obedience to such definition, would be "*a retrograde movement in the science.*" I hope Dr. Kane will pardon me for employing the language

to which he has resorted, in speaking of the opinions of Bonsdorff.

31. If this doctrine, as it has been stated, is to prevail, I do not perceive how it is to be prevented from claiming an inconvenient extension. The hydrates, as well as the sulphates, must have pretensions to contain salt radicals. Hence in the hydrated alkalies and alkaline earths, there would be a compound radical, consisting of hydrogen, with two atoms of oxygen, hydroxion, and these compounds would be hydroxionides; nor can I conceive that the haloid compounds, erroneously called double salts, but more correctly considered as single salts, can be exempted.

32. Between the reaction of fluoboric acid with fluobases, and sulphuric acid with oxybases, is there not a great resemblance?

33. I am unable to understand how, if the existence of salt radicals in oxysalts is inferred, the other salts of the amphigen class can be exempted from a corresponding inference. But if the existence of salt radicals in the double sulphides be admitted, can it be consistently denied that they exist also in double chlorides, iodides, &c.? Is there not the greatest analogy between the habitudes of sulphur, selenium, and tellurium, with metals, and those of the halogen bodies, so called?

34. Would not the modification of the etherial oxysalts, to comport with the new hypothesis, be disadvantageous, both as respects our mental conception of those compounds, and the names which would be rendered appropriate? Would not the transfer of the oxygen from the etherial oxide to the acid, and the creation, thus, of new salt radicals for the organic acid salts, be objectionable; such as oxyoxalion for oxalates, oxytartarion for tartrates, oxyacction for acetates; while, for their compounds, we should have oxyoxalionides, oxytartarionides, oxyacctionides, &c.?

35. If sulphates are to be considered as oxysulphionides, by what names are we to designate the sulphites, hyposul-

phites, and hyposulphates, SO^3 , $\text{S}^3 \text{O}^3$, $\text{S}^2 \text{O}^3$? SO^3 may, perhaps, with more propriety be considered as consisting of a compound radical, SO^3 , and oxygen, forming an oxide of sulphurous acid; but in a sulphite, anhydrous sulphuric acid, SO^3 becomes a species of oxysulphion itself, being as much the oxysulphion of the sulphites, as SO^4 is of the sulphates. Of course SO^3 should have a direct affinity for radicals, contrary to fact. I presume that sulphites would have to be trioxysulphionides; hyposulphites, sesquioxysulphionides; sulphates, quadroxysulphionides; while the hyposulphates would, I suppose, be demiquintoxysulphionides!!!

36. Analogous complication in nomenclature would arise in respect to the nitrites and nitrates, phosphites and phosphates, arsenites and arseniates; also as respects the carbonic and oxalic acids.

37. It is true that nature has not so made her bodies as that they can be separated into classes, between which any distinct line can be drawn: still it has been found advantageous to classify them to the best of our power. Accordingly it appears to me expedient, in the first place, to distinguish elements (or those compounds which act like them) according to their electro-chemical relations to each other, or their habitudes with the voltaic electrodes. Consistently, chemists have tacitly adopted the plan of treating the compounds formed by electro-negative elements with anions, as acids; those formed with cations, as bases; while the combinations formed by the union of such acids and bases have been considered as simple salts. Thus four classes are constituted, consisting of electro-negative elements, of acids, bases, and single salts, while, by the union of the latter, a fifth class of double salts is formed. Whether the words acid, base, and salt, be adhered to, objectionable as they are in some respects, and especially the latter, or some others be contrived, it would seem to me disadvantageous to merge them in one name, pursuant to the views of the advocates of

salt radicals, as stated by Gregory in his edition of Turner's Chemistry, 572.

38. The objection, that not being electrolytes the relation of acids and bases to the voltaic electrodes cannot be discovered, is easily remedied; since, on the union of a common ingredient with an anion and a cathion, there cannot be any doubt that the resulting compounds will have the same electro-chemical relation as their respective heterogeneous ingredients; so that, with the anion, an acid or electro-negative body will be formed; with the cathion, a base or electro-positive body. Moreover, as respects organic compounds which cannot be subjected to the electrolytic test, whatever saturates an inorganic acid must be a base, and whatever saturates an inorganic base must be an acid.

39. The word salt, I have shown, is almost destitute of utility, from the impossibility of defining it, and the amplitude of its meaning. A word that means every thing, is nearly as useless as that which means nothing.

(To be continued.)

ART. XXIII.—PURIFICATION OF NITRIC ACID.

BY M. E. MILLON.

THE ordinary methods of purifying nitric acid by nitrate of silver, nitrate of baryta, or litharge, and desiccation, always leaves in the product a certain quantity of nitrous acid, which exercises a marked influence on the properties of the acid. The aqueous solution of hydrosulphuric acid has been adopted by M. Millon, as the best test for the presence of nitrous acid. The nitric acid to be tried should be diluted with once or twice its volume of water; the least trace of nitrous acid causes the liberation of sulphur, which gives an opalescent appearance to the liquor. At the same time, a small quantity of ammonia is formed.

When the nitric acid contains no organic matter, it may be obtained free from nitrous acid, by setting apart the first products of its distillation, which contains the whole of the nitrous acid; but the best and surest method to adopt, even when the acid contains organic matter, is, according to M. Millon, to mix bichromate of potash with the acid to be purified, in the proportions of one part to one hundred of acid. The nitrous acid is transformed into nitric acid at the expense of the oxygen of the chromic acid.

This addition is sufficient for the purification of nitric acid, the density of which does not surpass 1.48; but for acid of a greater density than this, it is necessary to resort to other means, for the acid is decomposed under the influence of heat, and cannot be distilled.

In preparing the concentrated acid from the acid of commerce, it is well to separate, by distillation, the first third of the acid, putting into the retort some platinum wire, or what is better, spongy platinum. There will thus be drawn

off, in the first third of the acid, more than half the water it originally contained.

There is then to be added to the residue remaining in the retort, its volume of concentrated sulphuric acid; a very dense acid will be obtained by the first distillation, and this may be brought to the highest state of concentration by repeated distillations. During the distillation from sulphuric acid, the nitric acid carries over an appreciable quantity with it; on the other hand, the sulphuric acid in the retort retains a portion of the nitric acid, although the temperature be raised to 680° Fahr. The combination of sulphuric and nitric acids described by Kulmann, is no doubt formed here, and which, as is seen, is decomposed with great difficulty. When the decomposition is effected, pure oxygen is disengaged, and there remains in the vessel a combination of sulphuric acid and deutoxide of azote.

When the nitric acid has been separated, by a second distillation, from the sulphuric acid which it had carried over, it always contains a large quantity of nitrous acid. When in this state, it should be put into the vessel in which it is intended to be kept, and the temperature being raised to the boiling point, a current of dry carbonic acid should be passed through it. It should then be allowed to cool, still continuing the current of gas. If the density of the acid does not exceed 1.50, one operation of this kind will be sufficient to render it colorless; but with more concentrated acid, it is necessary to raise the temperature to ebullition, two or even three times.

In those cases where, after the first purification, the acid is nearly colorless, the purification may be completed by adding some fragments of white nitrate of urea.

The most concentrated acid that M. Millon was able to obtain by the application of heat and a current of carbonic acid gas, was perfectly colorless, very fuming, and not rendered turbid by sulphuretted hydrogen, when diluted with two or three volumes of water. According to the analyses

of M. Millon, this concentrated acid contains exactly one equivalent of water, and represents the first degree of hydration of nitric acid. According to calculation, the equivalent would be 14.24 to 100. Experience gives 15.07 for an acid, the density of which is 1.521 at 50° Fahr.

It has been generally admitted that concentrated nitric acid enters into ebullition at 187° Fahr. According to M. Millon, this appears not to be a fixed point, being retained only for a few moments by all the acids of a greater density than 1.50, 194°, 222°, and 232° Fahr., are analogous points, which occur, according to the quantity of the liquid, its density, the application of the heat, and several other circumstances, without the acid being fixed in its constitution. All the others contain a considerable quantity of nitrous acid, of which the heat alone does not deprive them. Thus nitric acid comes over in distillation mixed with nitrous acid, and its boiling point rises until it arrives at 253° Fahr. The acid which subsequently distils is colorless, and causes no precipitation with sulphuretted hydrogen. Its density is 1.484 at 64° Fahr.; this is an acid with two equivalents of water. It is only obtained to any extent in operating upon a large quantity of very concentrated acid. Seventeen pints afford about one pint. If the distillation be continued, the acid becomes more and more weak, until it arrives at that state of hydration, at which it possesses considerable stability: it then contains four equivalents of water.

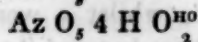
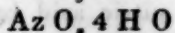
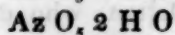
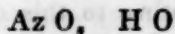
The general law relating to this distillation, has been well characterized by Dalton, who established one principle—that concentrated nitric acid becomes progressively weaker by distillation, whilst a weak acid is rendered stronger. M. Millon has observed, however, that the form of the retort in which the acid is distilled, and the presence of platinum wire, are capable of changing the point of ebullition, and even the nature of the product. In fact, in distilling a weak acid, without platinum wire, at a temperature from 257° to 262° Fahr., while the temperature was rapidly

rising, an acid was obtained of the density 1.20; on putting platinum wire into the retort, the point of ebullition fell to 252° , but the acid collected had only a specific gravity 1.175, instead of following the general rule with regard to the increasing density.

In distilling either a concentrated or a weak acid, the distillation of the last third of it presents some remarkable phenomena. A period arrives when the ebullition ceases; at the same time the thermometer, which stood at 250° or 252° Fahr., rises to 266° , or even 273° , and the acid passes into the receiver with great rapidity, without any appearance of bubbling or agitation; but it generally happens, that, in a few minutes there is suddenly disengaged an evolution of vapor, colored yellow by nitrous acid; the thermometer falls 14° or 18° Fahr., and in a few moments the ebullition recommences.

M. Millon concludes from these experiments, in relation to the distillation of the concentrated and the weak nitric acid, that the latter arrives at a state of hydration, at which it contains four and a half equivalents of water, and has a density not greater than 1.405, at 68° Fahr., while the former tends to stop at a point at which its density is 1.419, and which contains four equivalents of water.

We may, therefore, obtain, says M. Millon, by the processes which I have described, four hydrates of nitric acid.



Ibid, from Journal de Pharmacie.

ART. XXIV.—SIMPLE PROCESS FOR DETECTING THE PRESENCE OF MINUTE QUANTITIES OF IODIDE IN THE BROMIDES OF THE ALKALIES.

BY M. LASSAIGNE.

THE presence of the iodides of the alkalies in the bromides, which are now prepared by chemical manufacturers with bromine, obtained from the mother-waters of sea-salt works, is more frequent than may be supposed. This circumstance arises, as is known to Chemists, from the difficulty of isolating bromine, which is liquid at ordinary temperatures, from small portions of iodine found in the state of bromide.

Various samples of bromide of potassium, met with in commerce, have always afforded to M. Lassaigne a very small quantity of iodine; and it has been by means of the very delicate indication of the presence of free iodine which starch affords, that he has been able to make this observation.

On adding to a solution of the bromide of potassium to be examined, a few drops of a weak solution of chlorine, the liquor will be immediately colored yellow; if now a piece of white starched paper be introduced, it will be colored violet, or feeble indigo blue. This coloration depends upon the proportion of iodine set at liberty by the first addition of chlorine to the impure bromide.

When a sufficient quantity of the solution of chlorine is added, to decompose the bromide of potassium, the starch-paper is not immediately colored; for, in this case, the iodine exists in the liquor in the state of bromide, which does not act on the starch; but these remarkable phenomena are presented, the paper being removed from the

liquor and exposed to the air, the wetted part assumes a red tint in about a minute or two; it then turns to violet, and, lastly, becomes blue. The same reaction takes place, but not in so short a time, if the starch-paper be allowed to remain in the liquor.

This effect, which is no doubt due to the decomposition of the bromide of iodine by the organic matter of the paper, and probably by the starch itself, affords the means of detecting the minutest quantities of iodine in the bromides of the alkalies.

Ibid, from Journ. de Chimie Médicale.

ART. XXV.—NOTES ON THE TALLICOONAH OR KUNDAH OIL.

BY MR. ROBERT CLARKE.

Senior Assistant Surgeon to the Colony of Sierra Leone.

THE tree which furnishes the nuts from which Tallicoonah or Kundah oil is procured, is found growing abundantly in the Timneh country and over the colony. At the village of Kent, near Cape Schilling, the oil is manufactured as follows:—The nuts are dried in the sun, then hung up in wicker racks or hurdles, and exposed to the smoke of the huts; when exposed for a sufficient time, the nuts are roasted and subjected to trituration in large wooden mortars until reduced to a pulp. The mass is then boiled, when the supernatant oil is removed by skimming. The natives principally manufacture the oil to afford light; the leaves are used by the Kroomen as a thatch.

I believe the medicinal properties of Tallicoona or Kundah oil are unknown in Europe. Among the liberated Africans, the Sherbro and Soosoos, the oil is held in high estimation as an anthelmintic, the negroes and all classes of the colonists being very subject to worms. The sort of worms for which Tallicoona or Kundah Oil proves efficacious are the tape, lumbricus, and ascarides, more especially the two former; administered, however, in the form of enemata, the oil is successful in bringing away great numbers of the latter. When employed as an enema, one or two ounces may be thrown into the bowels, dissolved in warm water, of a temperature sufficient to retain it in the liquid state. I have used it in large doses (as much as ʒiiss) in "Lethargus,"* a disease of the brain in which it is desirable to act on the bowels with the most powerful drastic purgatives. Some of the colonists are in the habit of mixing with the palm and nut oils used to afford light, a portion of Tallicoona oil, to prevent their servants from using the oil with their food.

I have employed it in cases of worms, or where I suspected their existence, in doses proportionate to the age and strength of the patient. In such cases the dose has ranged from one ounce to one drachm, fluid measure. It is here necessary to observe, that its purgative effects were by no means always uniform. In persons of weak habit of body, and in whom there existed any liability to bowel complaints, the Tallicoona oil, from its acrid bitter properties, would prove injurious; but in persons in the opposite condition of body, I can confidently recommend this medicine as a safe and powerful anthelmintic. The usual way I have administered the oil is precisely similar to the modes in which castor or the other fixed oils are given. If given in proper doses, its purgative effects bear a close resemblance to those of castor oil, both in the length of time that elapses before

* See London Medical Gazette, Sept. 18, 1840.

its operation, and in the bulk of the stools produced. When over doses are taken, it produces the most violent hypercarthasis, cold sweats and vomiting, succeeded by collapse, and if remedial means are not promptly employed, even death. I may observe, that the negroes also use it as an expectorant. The best specimens are liquid, but it is more generally found concrete. The tree grows to the height of forty feet, the nuts being contained in a multilocular capsule. The oil is sold in the colony at two shillings a gallon, and could be procured in abundance from the coast as an article of commerce. I could spare to any of your medical friends, who wish to administer this oil as a remedy, a small quantity. I expect shortly to receive specimens of the root, stem, and leaf, and will forward them on their arrival.

63, Vauxhall Walk, Lambeth, London.

REMARKS ON THE ABOVE PAPER.

BY DR. PEREIRA.

"The 'nuts' described in Mr. Clarke's paper, are the seeds of the *Carapa Touloucouna* of the *Flore de Sénégambie*, a Meliaceous plant, figured in Sweet's British Flower Garden (i. 72,) and growing in dry places near Itou, on the shores of the Casamancia. The fruit is a large somewhat globular five-celled capsule. The seeds (of which there are from eighteen to thirty in each capsule) vary in size from that of a chestnut to a hen's egg: they are three-cornered, convex on the dorsal surface, of a brownish or blackish red color, and rugous. Specimens of the seeds with the fruit, are contained in the Banksian Collection at the British Museum. In the *Flore de Sénégambie*, the expressed oil of the seeds is called *Huile de Touloucouna*, and it is described as being sometimes liquid, sometimes solid according to the variable quantities of oleine and

strearine which it contains. A notice of its uses is said to be contained in the *Ann. de la Société Linnéenne de Paris*, for May, 1824, but I have had no opportunity of consulting this work. The oil owes its bitterness to an alkaloid principle, which MM. Petroz and Robinet (*Journal de Pharmacie*, t. vii. p. 48,) found also in the bark of the tree."

Mr. Redwood observed, that he had made a few experiments to determine some of the most prominent characters of the oil.—He found it to be entirely soluble in ether, and that alcohol separated it into two parts, a concrete substance, which was dissolved, and an oil fluid at ordinary temperatures, on which the alcohol took no effect. The former contained the bitter principle and the nauseous odor of the oil, the latter was nearly colorless and tasteless.

London Pharm. Transactions.

ART. XXVI.—COMPOUND DECOCTION OF ALOES.

MR. BLAND has favored us with the following remarks on this subject:—

"The decoction of aloes, as usually met with, deposits on standing, a copious and unsightly precipitate; this I consider arises from one of the following causes: either, first, the impurities contained in the extract of liquorice; second, the imperfect solution of the aloes and myrrh; or third, the decomposition of the aloes. With respect to the extract of liquorice, I find it difficult to procure it sufficiently pure; I, therefore, always use the common Italian liquorice (Solazzi juice) having first purified it by dissolving in distilled

water at 60°, and filtering the solution; a large quantity of impurity, consisting of ligneous matter, copper scrapings, &c., is separated, and a pure fine flavored solution of liquorice is the result. Having thus got rid of the first source of difficulty, I proceed as follows:—rub together the aloes, myrrh and carbonate of potash, add the solution of liquorice,* the rest of the distilled water and the saffron, and boil gently until reduced to the proper quantity, set aside the decoction until cold, strain through any substance of rather open texture, (a piece of muslin answers quite well) and add the tincture of cardamoms; during the next forty-eight hours a slight precipitate falls, after which no further change takes place. It is necessary that *distilled* water should be used, that the myrrh and aloes should first be well mixed with the carbonate of potash (not added indiscriminately to the water,) and that the tincture of cardamoms should be made with *proof* spirit, and not with a mixture of equal parts of rectified spirit and water, as sometimes practised. By attending to these directions, an efficient and uniform preparation may be always depended upon, and decoction of aloes thus made will keep perfectly well in a cool place for several months. The separate maceration of the saffron, as proposed by your correspondent in last month's Journal, would perhaps be desirable, as I find that the color of saffron (its only valuable property) is injured by boiling. I consider that a resinous soap is formed by the combination of the potash with the resin of the myrrh and aloes, and that the soap is *dissolved* and not held mechanically in suspension, for decoction of aloes is, if carefully prepared, perfectly bright, and in this state it is sent out from Apothecaries' Hall."

* We doubt whether any advantage is derived from boiling the extract of liquorice, which may be dissolved in a portion of the water, and added to the solution of myrrh, aloes, and potash, after the subsidence has taken place.—ED. PHARM. JOURNAL.

Mr. Tyson particularly objects to the use of Spanish liquorice, and thinks only the English extract should be used. He also objects to the myrrh, which he considers "worse than superfluous," and recommends English saffron.

Mr. Fisher (of Ramsgate) states, as the result of his experiments on the Compound Decoction of Aloes, that cold maceration is a much better process than the boiling, which is usually adopted. We have seen a sample of the preparation made in this manner, the ingredients having been merely macerated together for two or three weeks, and its appearance, flavor, and smell were remarkably good. We are informed by the maker of this decoction, that its effect is uniform and satisfactory, that it is always bright, and retains its properties longer than the decoction prepared in the usual way. With respect to the extract of liquorice, it is evident, that if the foreign be employed, it ought previously to be purified, as Solazzi juice contains generally between thirty and forty per cent. of impurities. English saffron is an article with which we are not acquainted.

Ibid.

ART. XXVII.—ON THE TRANSFORMATION OF CALOMEL
INTO CORROSIVE SUBLIMATE, UNDER THE INFLU-
ENCE OF THE CHLORIDES OF THE ALKALIES.

BY M. LEPAGE.

M. J. RIGHINI D'OLLEGIO, in a note relative to the action of steam on the protochloride of mercury, has given the result of some experiments which he undertook with the view of determining whether, as has been stated latterly, the protochloride of mercury is transformed into the perchloride under the influence of the chlorides of the alkalies, at the temperature of the human body.

The conclusions announced by this Italian Chemist have been entirely corroborated by the repeated observations I have made on the same subject. The following are the results of my experiments:—

1st. Protochloride of mercury, perfectly free from perchloride, and mixed with an equal weight of hydrochlorate of ammonia, or of a chloride of an alkali, digested in distilled water at a temperature of from 100° to 104° Fahr., during twenty-four, thirty-six, and even forty-eight hours, does not change color. The liquor, when filtered, has never indicated, by any reaction, the presence of even a trace of a mercurial salt.

Pigeons that were made to drink this liquor during several days in succession, suffered no injury. There appeared to be no diminution in the original weight of the calomel.

2d. The same mixture, exposed to a temperature from 120° to 140° Fahr., afforded a liquid which comported itself with reagents, and in its action on the animal economy precisely the same as the last mentioned.

3d. Nevertheless, by continued boiling, and under the influence of a large excess of chlorine, the transformation does take place; but it is even then only partial.

Ibid, from Journ. de Chimie Médicale.

ART. XXVIII.—ON GAMBOGE.

BY DR. BUCHNER.

THIS substance is obtained from several plants, as *Garcinia Gambogia*, *Gambogia Gutta* (Linnaeus,) *Mangostana Gambogia* (Gaertner,) *Stalagmites gambagioides*, *Hypericum bacciferum* and *cayanense*, natives of the East Indies, Siam, and Ceylon, whence it is imported in form of small cakes and rolls, or cylindrically-twisted masses. Its composition, according to Christison, is resin, gum, secula, fibrine, and water. The resin must be regarded as the chief constituent, and is most abundant in the Ceylon variety: it contains about 75.5 per cent., and is therefore the best for technical purposes, as painting. Powdered gamboge, treated with æther and evaporated, leaves a resin which retains a certain portion of the æther, and has a glutinous property, which it only loses when exposed to a very high temperature. The qualities of the resin are those characteristic of an acid, and, indeed, those of a fatty acid. Its composition gives, as demonstrated, by consuming it with oxide of copper, this per centage composition:—

	I.	II.
Carbon,	71.87	72.22
Hydrogen,	7.06	7.41
Oxygen,	21.07	20.37
	<hr/> 100.00	<hr/> 100.00

To determine the atomic weight of the acid, the salts of silver, lead, and barytes were subjected to analysis. The results were as follows:—

Salt of Silver,	$C_{60} H_{35} O_{12} + Ag O.$
Salt of Lead,	$2 C_{60} H_{35} O_{12} + 5 Pb O.$
Salt of Barytes,	$4 C_{60} H_{35} O_{12} + 3 Ba O.$

Johnston found, in 100 parts of the resin of gamboge in the uncombined state:

Carbon,	71.70
Hydrogen,	7.03
Oxygen,	21.27

Whence he calculated the formulæ, $C_{40} H_{23} O_9$ and $C_{48} H_{24} O_{10}$, which give, with the metallic oxides, results varying but little from those deduced from the above analysis.

After extracting the resin of gamboge by æther, the residue was digested in pure alcohol, the result of which was a glutinous substance, which on distillation left a glutinous brown extract, soluble in water, a property distinguishing it from the fatty acid extracted by æther. It exists but in very small proportions. The residue, remaining after the treatment of gamboge with æther and alcohol, when boiled in water, left only impurities of wood and sand mixed with the gamboge of commerce; whilst the solution, on account of its mucilaginous properties, would not pass through a filter. Diluted with water and drawn off by a syphon, the fluid was concentrated by evaporation. The gum thus obtained was digested and washed with spirit until it was

nearly colorless, and dried at 100° C.; this yielded, when finely powdered, a yellowish white powder. By analysis he found its composition as follows:

	I.	II.
Carbon,	44.00	44.94
Hydrogen,	6.22	6.11
Oxygen,	49.78	48.95
	<hr/> 100.00	<hr/> 100.00

From these analyses it follows, that this substance has the elementary composition of starch, or anhydrous sugar, as may be seen in comparing the annexed table.

	Gum of Gamboge.	Gum Arabic.	Starch or Anhydrous Cane Sugar.
Carbon =	44.94	42.58	44.91
Hydrogen =	6.11	6.37	6.11
Oxygen =	48.95	51.05	48.98
	<hr/> 100.00	<hr/> 100.00	<hr/> 100.00

This composition led to the inference that the gum treated with nitric acid might be converted into mucic acid, or, by treating with dilute sulphuric acid, into sugar, an inference which experiments proved to be well founded.

Gamboge owes its color to the fatty acid; with water it forms an emulsion, the water dissolving the gum, and a small quantity of a brown-red coloring matter, into a mucilage, in which the coloring matter is held in suspension. This examination finally proves, that the resin of gamboge resembles a fatty acid, that it contains a small quantity of a peculiar red-yellow coloring matter, soluble in water and alcohol, and a greater quantity of a gum-like substance, having the composition of flour of starch, which, by sulphuric acid, may be converted into sugar not capable of undergoing fermentation.

The analysis of two specimens of gamboge, given by Professor Christison to Professor Liebig, gave the following results:

	Analysis of NO. I.	Analysis of NO. II.
Fatty acid, soluble in æther,	= 79.794	78.841
Coloring matter, soluble in alcohol and water,	= 0.573	41.030
Gum,	= 19.519	12.595
Residue,	= 0.114	4.534
	<hr/> 100.000	<hr/> 100.000

The residue of No. II. consisted chiefly of particles of wood-dust and sand.

The specimen No. I. was labelled "Finest Siamese cane gamboge from Singapore, from a sample never met with in commerce."

No. II. was labelled "Ceylon gamboge, prepared for native commerce, but never met with in the commerce of Europe."

Ibid, from Annalen der Chemie und Pharmacie.

ART. XXIX.—ALBUMINATE OF IRON.

BY MR. A. J. COOLEY.

THIS preparation, better known in France than England, is usually prepared by the following method:—

Albumen, or white of egg, is diluted with distilled water; the mixture is filtered, and a solution of persulphate of iron is added until precipitation ceases; the deposit is then washed and dissolved in alkalized* alcohol. It is very evident, however, that this solution does not answer to its name, and in this state, from the amount of alkali it contains, will prove unfit for administration, in many cases where chalybeate tonics are indicated.

It has been my endeavor to remove this objection, and after some experiments for that purpose, I find the solution of albuminate of iron is best made by dissolving its hydrous oxides in the newly diluted and filtered white of egg, which takes up a considerable portion of both the freshly precipitated protoxide and sesquioxide. The liquid may be filtered, and will be found, by testing, to contain a large proportion of metal. In the case of the sesquioxide in particular, the solution will keep for some time without decomposition, and its permanence may be further increased by adding a little alcohol, with which it will mix without precipitation. In this respect it resembles many other preparations of the same oxide. I have now before me two four-ounce phials of this preparation—the one with spirit, the other without any. The simple solution was made about ten days since, and placed in a temperate situation, loosely corked, for the

* Caustic potassa must be used.

purpose of ascertaining its conservative powers. It is barely so clear as it then was, but differs in no other particular. The other phial, to which a little alcohol was added, has kept nearly three weeks without any visible alteration. When tested for iron, they both yield precipitates as before. It may be further remarked, that this preparation is compatible with caustic solution of potassa, and no doubt the other alkalis and their carbonates.

As a therapeutic agent, the albuminate of iron is highly spoken of by M. Lassaigne and other high authorities, who recommend it as a preparation especially adapted by its nature, on theoretical grounds, for combining with the tissues of the body. It will, no doubt, ere long, take a prominent situation among the most esteemed of our chalybeates.

The Chemist.

ART. XXX.—OBSERVATIONS ON CYANIDE OF POTASSIUM AS A REMEDIAL AGENT.

By Mr. DAVID STEWART, of Baltimore.

THIS compound of cyanogen has been recommended as a substitute for prussic acid, and when it is desirable to obtain the effects of that valuable agent in combination with medicines which cannot easily be administered except in powder, it is a convenient substitute for it. Several difficulties, however, attend its use in any form. One of the most formidable is its variable effect resulting from its partial or

total decomposition on entering the stomach—an effect which unfortunately cannot be controlled by the physician, as the weakest acid will decompose it in preference to uniting with carbonate of soda, magnesia, or any other compound with which it is usually administered. Should it meet with free carbonic acid in the stomach, prussic acid would gradually be eliminated, producing the pleasant effects which often result from its exhibition; but when it meets with a stronger acid in sufficient quantity, 10 minims or ʒi of prussic acid are at once liberated, causing vertigo, peach kernel eructations, and other distressing consequences.*

In an article published in this Journal, Vol. 1, No. 1, p. 264, I endeavored to show, from the authority of some of the first chemists in Europe, that it was very liable to vary in strength during the most careful preparation, and that it is extremely apt to suffer decomposition from various causes, after it has been prepared in the most judicious manner. Its subsequent introduction into the new Pharmacopœia, and its popularity among the physicians of our city, have led me to test the veracity of the eminent chemists† referred to, as to its variable quality. I procured six samples from six of the best retail stores of Baltimore, where the great proportion of prescriptions are compounded. Each was carefully weighed with the same weight, and immediately transferred into a solution of nitrate of silver in dilute nitric acid, using the same proportion of nitrate in each case. The result was an insoluble precipitate of cyanide of silver, corresponding with the proportion of cyanogen existing in the cyanide of potassium.

* These results have followed its exhibition in medium dose on several occasions in our city, in the hands of some of the most eminent physicians, and those who have used it most frequently.

† Dr. Trouve, MM. Pelouse and Gieger, and M. Boidet.

The first was prepared according to } 11 grains of cyanide of silver, or
the process of U. S. Pharmacopœia, } about 109 grains of
modified by the use of a water bath } prussic acid.
in evaporating the salt.* 5 grains }
yielded,

No. 2, prepared from alcoholic solution—[See Maryland Medical Journal, Vol. 1, No. 2, p. 201.] 5 grains } 5 grains cyanide
yielded,† } of silver, or 49
minims of prussic acid.

No. 3, prepared recently as No. 1. 5 } 9½ grs. cyanide silver,
grains yielded, } or 94 prus. acid.

No. 4. 5 grains yielded, } 6 grains cyanide of
silver, or 59 grains
prussic acid.

No. 5, prepared by one of the most } 7 grains cyanide
careful and experienced manufacturing } of silver or 69
chemists in Philadelphia. 5 grs. } minims of prussic
yielded, } acid.

No. 6, French manufacture. 5 grains } 6 grs. cyanide of
yielded, } silver, or 59 minims
prussic acid.

I think we have now proved from the best authority, and from actual experiment,

First, That if cyanide of potassium could be prepared of a definite strength, its effects must vary exceedingly, and that its use may be attended with the most dreadful consequences, should several doses accumulate in the stomach or intestines, and be followed by an acid.

Second, That it is liable to be decomposed during the most careful preparation.

* G. W. Andrews, M. D., suggested this modification at a meeting of Maryland College of Pharmacy.

† The gentleman from whom I obtained this sample has since given me the assay of five grains recently prepared by the same formula which indicates 95 grains of prussic acid.

Third, That when prepared in the best manner it is constantly liable to change, from causes that cannot be avoided, in dispensing it.

Fourth, That the process of the U. S. Pharmacopœia modified by evaporation in a water-bath is the best process yet proposed for preparing it.

Fifth, That its only value with reference to prussic acid is the facility with which cyanide of silver is formed by its decomposition, as indicated in the assay of the above samples. Moreover, I may remark that the necessity for a substitute for prussic acid has ceased,—since the merest tyro can prepare that acid extemporaneously of invariable strength, without any apparatus except a glass vial, by the beautiful process of the last Pharmacopœia.*

Maryland Med. & Surg. Journal.

* Should the muriatic acid used in the process referred to be in excess, (in the absence of a specific gravity measure,) it will only tend to preserve it; and if the chloride of silver is lost, the result is less expensive than the commercial prussic acid.

ART. XXXI.—THE FERRUGINATED PILL OF MERCURY.

BY DR. COLLIER.

THE varying and unsatisfactory quality of our "blue-pill" has for many years attracted attention. In my second edition of the London Pharmacopœia, I gave the outline of a formula for preparing it with sesquioxide of iron; the further experience of years enables me to offer this preparation as a boon to the profession and to the public, for it may be proved that the iron enters along with the mercury into the blood, and saves the wear and tear of the human body under its use. I will not at this time canvass, because I doubt, the probability of the sesquioxide (in double equivalents) yielding up one atom of its oxygen to the mercury, as is the opinion of several chemists to whom I have submitted this compound. I am aware that other peroxides, when moist, will similarly combine and divide mercurial globules; and I will not now enter upon the series of incomplete experiments instituted by myself to prove that mercury will amalgamate with other metallic oxides, and in this state form double or triple salts with acids. I shall now keep only to the practical utility of my compound, and to its importance as a great remedial improvement.

The following is the formula:

R. Ferri sesquioxidi, ʒj.

Hydrargyri, ʒij.

Confect: Rosæ Gallicæ, ʒiij.

Contere donec globuli non amplius conspiciantur.

It is made in five minutes; common blue-pill demands a week. The globules are not visible, even by the microscope. It is uniform in its appearance and effects. It makes a smoother pill, retaining its form more permanently. It salivates in a few days in the usual doses. It is particularly

eligible for the strumous, the irritable, and for reduced anæmial constitutions requiring mercury. The powers of life are not so much (scarcely at all) prostrated under its use. Its resolvent power is greater than that of mercury alone, especially with respect to buboes. Practitioners will at all events know what they are using; at present they have for blue-pill all manner of alloys and sulphurets—mercurial-zinc pill, mercurial-sulphur pill, &c. &c.

Five grains of the sesquioxide will suffice to amalgamate and divide a large quantity of mercury, but I propose the larger proportion as a remedy.

London Lancet, March 11th, 1843.

[The facility with which mercury may be reduced to a state of minute division by means of vegetable extracts, has already been pointed out in this Journal, vol. i., page 203, the time required for this purpose varying from ten minutes to half an hour, according to the nature of the extract employed. The therapeutic value of Dr. Collier's preparation, as detailed in the above paper, entitles it to the consideration of the profession, as a new remedy, but we cannot recommend the use of any succedaneum in the preparation of the blue pill of the Pharmacopœia. A strict adherence to the order of the college produces a result uniform in strength and appearance.—ED. PHARM. JOURNAL.]

ART. XXXII.—ON SYRUP OF POPPIES.

BY MR. THOMAS SOUTHALL.

HAVING found great difficulty in obtaining an elegant preparation of syrup of poppies, by the process directed in the London Pharmacopœia, we have tried various means of improving it, and think we have succeeded in doing so by extracting the virtues of the poppy by percolation with cold water, and, as far as we can judge, without impairing in any degree the efficacy of the syrup.

The capsules, from which the seeds have been separated, are weighed, and then dried, by which they lose from ten to fifteen per cent. They are then bruised, and passed through a sieve of three-eighths of an inch mesh. They are next macerated in a mash-tub, several portions of cold water being added, and stirred with them, to ensure the whole being uniformly moistened. About an hour afterwards, the infusion is drawn off from the bottom of the vessel, more water being poured on the surface; after which the infusion is allowed to run off during the day. The quantity of water used is about the same as that which is directed in the Pharmacopœia. The infusion is evaporated as it is drawn off, to nearly the consistence requisite for making the syrup, and allowed to stand during the night. The clear portion is poured off the following morning, the remainder strained through a calico bag, and the sugar is dissolved in the clear liquor with as much heat as is requisite for the purpose. The medicinal properties of the poppies appear to be extracted effectually by means of cold water, while the syrup is brighter and of better quality, on account of the absence of the starch, which is dissolved in it, if boiling water is used in making the infusion.

The poppy capsule appears to contain both albumen and starch, and when the former is solidified, and the latter converted into a jelly by the application of boiling water, the medicinal principles of the poppies are extracted with more difficulty. Syrup of poppies, as usually prepared, is very liable to fermentation; this I attribute chiefly to the presence of the starch, which is favorable to this kind of decomposition, and which, by increasing the density of the fluid to a consistence approaching to that of a jelly, obstructs the separation of the fæces by decantation or filtration.

London Pharm. Transactions.

ART. XXXIII.—ON THE PROPER TIME FOR COLLECTING
CERTAIN ROOTS.*

BY DR. BUCHNER.

THE importance of determining which is the best period of the year for collecting certain medical plants has been pointed out by Buchner. Neutwich employed the following method for the purpose of ascertaining this point. The plan, although short and easy of execution, does not give any idea of the peculiar constituents of the samples:

He cleansed the fresh roots from adhering earth by means of a brush; a certain quantity was then dried in the air, and its loss of weight remarked; it was then boiled several times with water, the extracts evaporated down to oz., cla-

* Pharm. Central Blatt., 1842, p. 688; as given in the London and Edin. Monthly Journal of Medical Science, Jan. 11, 1843.

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rified with white of egg, filtered, edulcorated, and the filtered solution reduced to four oz., and when cold the specific gravity determined.

Only the following roots have as yet been examined:—

NAME OF THE ROOT.	Quantity employed.	Dried in the Air.			Quantity of Dried Root Extracted.	Spec. Grav. of the Clear Ext. Evap. to 3 oz.
Rad. Taraxaci in Autumn	oz. 12	3	3	gr. 52	oz. 2	1.120
“ “ Spring	12	2	4	12	2	1.095
Rad. Bardaniæ in Autumn	12	3	2	36	2	1.147
“ “ Spring	12	2	0	0	2	1.062
Rad. Saponariæ in Autumn	6	2	0	56	1	1.044
“ “ Spring	6	1	5	3	1	1.032
Rad. Cichorei in Autumn	6	1	5	39	1	1.080
“ “ Spring	6	1	2	8	1	1.040

The Chemist.

ART. XXXIV.—ON THE FORMATION AND COMPOSITION
OF SESQUICARBONATE OF SODA.*

BY HERMANN.

THE former opinion, that the sesquicarbonate of soda is formed by the ebullition of solutions of bicarbonate of soda, which should then allow half an equivalent of carbonic acid to be disengaged, has already been refuted by Rose. That chemist has found that the solutions of bicarbonate of soda completely disengage their second atom of carbonic acid by exposure *in vacuo*, or by long boiling. He has not succeeded in obtaining crystals of sesquicarbonate of soda with solutions composed of equal atoms of bicarbonate and simple carbonate of that base.

The conditions in which the sesquicarbonate of soda is formed were hitherto unknown. Hermann thinks he has found them. This salt is not produced by crystallisation in aqueous solutions; it is then decomposed into bicarbonate and carbonate of soda, which crystallise separately; but it is very easily formed, according to this chemist, by efflorescence.

If, then, we promptly combine by the boiling, concentrated solutions of bicarbonate of soda, and if we thus prevent the second atom of carbonic acid from being completely disengaged; if we fuse together equal atoms of bicarbonate and simple crystallised carbonate of soda, in the water of crystallisation of the latter, and if the mass be dried; finally, if bicarbonate of soda be heated to a temperature not exceeding 200° C., saline masses are obtained, which consist chiefly of sesquicarbonate of soda. To obtain them in the crystallised state, it is sufficient to expose them for some time to the action of damp air, especially in cellars.

* Journal für Praktische Chemie.

If they are examined at the expiration of a few weeks, it is found that they have assumed, by absorption of water, a perfectly crystalline appearance.

The quantitative analysis of this salt has demonstrated that the present formula ($\text{So O}^2. 3\text{C O}^2 + 4\text{H O}$) is not quite correct, but that its composition corresponds to the formula $\text{So O}^2. 3\text{C O}^2 + 3\text{H O}$.

100 parts gave:—

Soda	40.00
Carbonic acid	43.06
Water.	16.94
	<hr/>
	100.00

Which gives—

		Calculated in 100 parts
2 at. soda	= 781.8	40.12
3 " carbonic acid	= 829.2	42.56
3 " water	= 337.4	17.32
	<hr/>	<hr/>
1 " crystallised sesquicarbonate of soda	= 1948.4	100.00

Heated to redness over a spirit lamp, sesquicarbonate of soda leaves, the same as the bicarbonates of potassa and soda, a portion of carbonate. It partakes, then, with these bicarbonates, the peculiarity of allowing the excess of carbonic acid to be more completely disengaged by the ebullition of its solutions, than by the calcination of the dry salt. *Ibid.*

ART. XXXV.—PRECAUTIONS TO BE ADOPTED IN THE
EMPLOYMENT OF ALKALINE DRINKS AS LITHON-
TRIPTICS.*

It cannot be denied that, in certain circumstances, calculi are formed in the bladder under the influence of the continued and unmethodical administration of alkaline medicines. Must it be concluded from this, says M. Bouchardat, that bicarbonate of soda is useless, and even dangerous, in the treatment of gravel and calculus? Certainly not; but it is necessary to know how to aid this powerful means, in order that it may render all the services which we have a right to expect from it. According to this physician, the two indispensable adjuvants of all lithontriptics are: 1st, abundant aqueous drinks; 2d, a moderate surrounding temperature. When alkalis are prescribed, it is not absolutely necessary that they should be as concentrated as they are generally ordered: 1st, because drinks so powerfully medicated are not so easily absorbed; 2d, because a sufficient quantity cannot be swallowed every day without disgust and inconvenience. Thus, for example, the waters of Vichy contain much more alkali than is necessary, for one gramme of bicarbonate of soda is quite sufficient for one quart of water.

It is always to the bicarbonates that we should have recourse. What greater advantage, indeed, can be expected from the subcarbonates and from caustic alkalis? Evidently none; for, during the assimilation, they are converted into bicarbonates; and it is in this state that they exist in the blood. The more caustic alkalis, therefore, present the inconvenience of more powerfully attacking the digestive apparatus without ulterior advantage. When the fatigued

* Journal de Chimie Medicale.

stomach is no longer able with the same ease to bear water holding in solution bicarbonate of potassa or soda, these salts may even be replaced by citrate of soda, which, during the assimilation, is converted into bicarbonate of soda, and which, finally, has the same influence as the latter salt on the composition of the urine.

The following drink may be prescribed:—

R. Bicarbonate of potassa	1 gramme.
Water	1 quart.
White sugar,	50 grammes.
Tincture of vanilla,	5 grammes.

Mix and dissolve.

According to the taste of the patients, the tincture of vanilla may be substituted by tincture of cinnamon, tincture of orange, tincture of citron, &c., in the dose of one gramme, and the bicarbonate of potassa by bicarbonate of soda, or by a double dose of the citrate or malate of the latter base. The essential point is to give the patient a drink which will please him without fatiguing his stomach, and without causing disgust—and this is really a very difficult matter in some circumstances. The beneficial action of certain mineral waters in cases of gravel, may certainly be attributed to these waters being easily borne by the stomach, easily digested, and that a very large dose of them may be taken daily. This is the secret of the efficacy of the waters of Contrexeville. Indeed, the small proportion of iron which these springs contain, and the carbonic acid which they disengage, excite the stomach, and large quantities of the water may be daily swallowed with impunity, without fear of disorder in the exercise of the digestive functions.

As regards what is meant by large quantities of water, it is a point which may be very variable according to the individuals; but the following is a rule which M. Bouchardat indicates as a very easy guide in this respect: the urine of a healthy man becomes turbid, and deposits by cooling,

when abundant aqueous drinks are not swallowed; on the contrary, it always remains limpid in the latter case, if, however, excessive perspiration does not exist. When lithontriptic drinks are made use of, the urine must be daily observed, so that it may be brought to such a state as not to deposit by cooling. When this result is arrived at, says M. Bouchardat, the gravel will disappear, and the calculi will be gradually dissolved, for there is established in the bladder a continual exchange between the bladder and the calculus. If the urine is concentrated, it deposits; if it is not saturated, it dissolves. All efforts must, therefore, be directed to maintaining it in the latter state.

Three or four quarts of aqueous drinks in the twenty-four hours are most commonly sufficient for attaining this end; six and more are sometimes required. But these lithontriptics are, in general, really and surely useful only when the urine remains limpid after cooling.

Drinking is not all that is required, adds M. Bouchardat, in conclusion, for obtaining abundant urine; perspiration must also be avoided. This is easily obtained by wearing a moderate amount of clothing, by carefully avoiding too rapid motions, and by rubbing the surface of the skin with a fatty body.

Ibid.

ART. XXXVI.—NOTE ON A BLUE URINE.*

BY M. A. BOUCHARDAT.

THIS urine, which was voided before Dr. Priesnitz, was sent to Dr. Schmitz, who transmitted it to M. Bouchardat. It was passed by a patient who had resided for 27 years at Surinam, and who had been during that period affected with two very obstinate intermittent fevers, accompanied by a very considerable enlargement of the spleen and liver. This patient, after having without success undergone many courses of treatment, and after having taken considerable quantities of quinine and port wine, went, in 1839, to Gräffenberg, where he was submitted, for nine months, to the hydrosudopathic treatment, without deriving much advantage from it; indeed, if the powers were restored, the swelling of the spleen and liver always appeared. In the ninth month, he had observed that the wetted compresses applied to the abdomen were stained with brown-red stains, similar to those which are produced by decoctions of quinquina. Fifteen days afterwards, he remarked, in the morning, that his urine had changed color, that it had become dark; and some hours afterwards, he found that it was perfectly blue, after which it passed successively to green, then to blackish. This phenomenon continued for about a fortnight, and, at the end of that time, the cure was completed. The patient remained eighteen months at Gräffenberg, to acquire strength and to perfect his return to health: from that time, there has not been the slightest appearance of relapse, and the liver and spleen have returned to their normal size.

Dr. Schmitz has three times observed blue sediments in

* Journal des Connaissances Médicales Pratiques, July, 1842.

the urine of patients subjected to the hydrosudopathic treatment; two affected with syphilis, and an old Dane who had obstructions of the abdominal viscera. One of the two syphilitic patients had been submitted to mercurial treatment; the other had not taken mercury. In all three cases, the blue sediments were observed in the period of cure.

The same physician has observed, besides, sediments of the same color in the urinary of the establishment of Priesnitz.

To return to the urine in question: the following are the peculiarities observed in it by M. Bouchardat:—

1. It exhaled a powerful ammoniacal odor; its taste was saline; it had a deep blue color; it deposited a sediment of a fine blue.

2. Examined with the microscope, the sediment seemed to be formed of globules of excessive tenuity, of great regularity of form (which was ovoid) and of dimensions, which may be estimated at about one-third of those of the globules of human blood.

3. This urine returned the blue color of litmus paper reddened by an acid.

4. Reagents detected in it the presence of phosphates, sulphates, chlorides of lime, magnesia and ammonia.

5. The blue coloring matter partly dissolved in ether, to which it imparted a blue color; the ethereal liquids being evaporated, furnished a very slight residue of a fixed oil of a repulsive odor.

6. Alcohol partly dissolved, by aid of boiling, the coloring matter, and left a residue of a deeper color.

7. Nitric acid destroyed the coloring matter, and furnished a straw-colored liquor.

8. Sulphuric acid, diluted with twice its weight of water, did not cause any change.

9. The solution of oxalic acid dissolved the coloring matter, and a blue liquor was obtained, which, when filtered, was very limpid.

10. Ammonia did not produce any alteration in the coloring matter.

11. Potassa disengaged ammonia, and, by boiling, destroyed the coloring matter.

According to M. Bouchardat, this urine appeared to contain the saline principles of ordinary urine: as regards the coloring matter, it was quite special, and the microscopical examination as well as the action, induce the belief that it was a peculiar organic substance.

What can have been the origin of this singular matter? It is known that, under the influence of hydrochloric acid, albumen gives an intense blue color, which is not altogether unlike the product in question; but, in the economy, this acid is never found in a state of concentration sufficient for producing this conversion.

M. Bouchardat concludes by adding, that he observed, twelve years ago, a blue coloring matter which bore the greatest resemblance to the sediment of this urine, and which acted in exactly the same manner with reagents; it was produced by the spontaneous alteration of gluten, kept in dry air. It may be admitted, according to that, that albuminous matters are susceptible of being spontaneously converted, in certain rare and undetermined circumstances, into organic globules of a fine blue color. *Ibid.*

ART. XXXVII.—PREPARATION OF CITRATE OF IRON.

BY M. HECTOR BERNIER.

IN the Journal de Chimie Médicale for December, 1842, M. H. Bernier publishes the following method of preparing citrate of iron:—

R. Pure protosulphate of iron	1
Carbonate of soda	1.5

After having separately dissolved the salts, the solutions are mixed: the precipitated carbonate is collected on a filter, and washed with distilled water to free it from any sulphate of soda which it may retain; after this washing, it is put into a porcelain capsule with a little distilled water; pure citric acid dissolved in the smallest quantity of water is then added to the liquor, which is kept stirred, until the carbonate of iron is partly decomposed; the liquor is then left to itself for one or two days, and occasionally stirred. If the carbonate of iron is not entirely dissolved, a few drops of citric acid are added, and it is filtered.

In this manner a very concentrated solution of citrate of iron is obtained, and nothing further is required but evaporating it in flat-bottomed porcelain plates, at a temperature of 25° to 30° C.

This process yields citrate of iron of a fine garnet color. We may thus, with almost all the weak acids, prepare salts of iron. *Ibid.*

ART. XXXVIII.—PREPARATION OF SOLUBLE CREAM OF TARTAR.

BY M. CAMBORNAC.

R. Bitartrate of potassa	400 gr.
Borate of soda	200 gr.
Tartaric acid	11,000 gr.

I dissolve the salts and the acid together; when the solution is complete, I clarify it with white of egg, and filter. I again put it on the fire and continue the operation as directed by the Codex. The product is of a decided acid taste, very soluble, and possessed of purgative properties as active as those of ordinary cream of tartar; and is decidedly preferable to the latter.

Ibid, from Journ. de Chimie Médicale.

MISCELLANY.

*Decoction of Nut-Galls as an antidote for Cicuta Virosa, Hemlock.**
By Dr. MEYER, of Creutzburg.—On the morning of the 19th of March, 1841, four children, of three, five, and six years of age, found in the neighborhood of the village in which they lived, some roots of *cicuta virosa*, which had been carried there by the current of a rivulet, and, having mistaken them for parsneps, they ate the greater portion of them. The child aged three years was very soon attacked with colic, vomiting, and convulsions, and died at 1 P. M., without any treatment having been resorted to.

The parents, who had learned this circumstance from the other three children who were affected in the same manner, and who had found in their hands another root of *cicuta*, made them drink milk in abundance, and at the same time sent for a surgeon, who immediately requested the assistance of Dr. Meyer.

On the arrival of this physician, at about 2 o'clock, the three little patients had already taken ipecacuanha, but only a few and very scanty vomitings had resulted from it. The body of each of these children was cold, the countenance pale and wan, the pupils much dilated and fixed; there were violent colics, and spasmodic motions throughout the body; two of them had entirely lost consciousness, while the third regained his senses from time to time, and complained of singing in the ears and vertigo, after which he again fell into a comatose state. The respiration, in one of the children, was feeble and scarcely perceptible; but in the other two it was irregular, stertorous, and occasionally interrupted by sighs. The motions of the heart did not present their normal regularity; they were occasionally stopped for a longer or a shorter time, then they returned in a tumultuous manner; the arterial pulsations, slow in general, presented nearly the same anomalies.

Large doses of sulphate of zinc were immediately administered to the three patients, and several vomitings, accompanied with violent shocks,

* Journal de Chimie Medicale; from a German periodical not quoted.

very soon resulted: many pieces of the root of cicuta, softened by its stay in the stomach, were recognised in the vomited matters. The vomitings were aided and maintained by means of diluents, and by frictions of the epigastric region. At the same time glysters, to which vinegar was added, were administered, cold compresses were applied to the head, and a powerful revulsion exerted on the limbs, by means of cataplasms of mustard and horseradish. The extremities, which were of icy coldness, were rubbed with well warmed flannels, and heat was thus restored to them.

At the end of an hour, the state of stupor, the spasms and colics, began to diminish a little, in proportion as the vomiting and purging became more frequent. It should be noticed that the matter of the alvine dejections was liquid and colored yellow by bile.

A decoction of nut-galls, which had been prepared in the interval, was now administered in large and frequent doses during the first day, then in smaller and less frequent doses during the two following days. The results of this treatment were most favorable, for all the alarming symptoms gradually diminished, and, at the end of five days, the three patients were entirely recovered: from that time nothing but a simple and mild diet was prescribed for them.

The decoction of nut-galls already recommended by Drs. Phœbus and Meurer, or if preferred, the tannin, which is its active principle, in this case produced all that could be desired of an antidote. Indeed, the root, which was in all its power, contained a very strong poison, and it had been taken in great quantity, since the second root, which was less than that which had been eaten by the children, weighed 60 grammes. Moreover, the poisoning took place at 10 o'clock in the morning, a time of day at which the stomach is almost empty, because in the country it is customary to breakfast very early. Finally, the poisonous principle had had, during four hours, all the time necessary for developing its injurious effects on subjects so young and so highly sensitive to impressions.

The poisoning was very violent, as the symptoms have sufficiently shown; nevertheless, the antidote, after having been preceded by vomitings, in a short time, and in a manner at once simple and sure, caused the last traces of the symptoms of poisoning to disappear. A *post-mortem* examination of the fourth child was not allowed.

The Chemist.

Association of Sulphate of Quinine with Carbonic Acid in the treatment of Marsh Fevers. By Dr. MEIRIEU.—I have for many years practised in a marshy country, where intermittent fevers are endemic. I

have given quinine in all its forms; but in certain cases, seeing that sulphate of quinine did not answer my purpose, I associated this salt with carbonic acid, in order to combat with greater advantage, the effects of the marshy infection which are complicated by a spasmodic state of the stomach; in this view, I make a mixture of tartaric acid, sulphate of quinine, bicarbonate of soda and sugar. I have administered this aerated febrifuge powder, while effervescing, in the interval between the fits, after having dissolved it in half a glass of water: the patients take it without repugnance, and the fits ordinarily disappear after two or three doses.

I have observed that sulphate of quinine, rendered soluble by sulphuric, tartaric, or citric acid, acts with great energy, even in a smaller dose, than ordinary sulphate of quinine.

The following are the directions for preparing the powder:—

R. Tartaric acid	9 grammes.
Sulphate of quinine	10 centigr.

Triturate well and add to the mixture—

Bicarbonate of soda	1 gr. 20 centigr.
Powdered sugar	2 grammes.

For one dose to be taken in half a glass of water, at the moment of effervescence, or else the two mixtures may be separately dissolved in 30 grammes of water, and the solutions mixed and drunk at the moment of effervescence.

The following is the composition of this gaseous febrifuge:—

Sulphate of quinine	10 centigr.
Tartaric acid	4 grammes.
Bicarbonate of soda	5 “
Powdered sugar	30 “
Water	1 litre.

Care must be taken first to introduce the sugar into the bottle, then the quinine dissolved in tartaric acid, and immediately afterwards the bicarbonate: the bottle must immediately be hermetically sealed to prevent the escape of gas. It may be taken in the dose of half a glassful or a glassful every two hours. *Ibid.*

The Metal Didym.—The seventh number of Poggendorff's Journal, contains a notice of the metal which Professor Mosander has recently discovered united with oxide of cerium, in which body he had pre-

viously discovered lanthanum. This metal Professor Mosander has called *didym* (as being the *twin-brother* of lanthanum;) he has not yet discovered any good method of effecting its complete isolation. The oxide of didym imparts to the oxide of cerium its brown color, and also confers on certain salts of yttria, a more or less deep rose-red, or amethyst hue. Pure oxide of cerium and pure oxide of lanthanum are almost colorless. Hydrated oxide of cerium has a sulphur yellow color. Sulphate of didym has a tint intermediate between rose-red and amethyst. When the brown oxide of didym is subjected to a strong red heat, it loses its color and assumes a dirty white appearance. Its density does not, however, seem changed.—*London Pharm. Trans., from Poggen-dorff's Annalen*, No. 7, 1842.

On Coca and Matico. By Dr. MARTIUS.—Dr. Martius examined a specimen of the noted Coca or Ypada of the Brazils. It is the leaf of the *Erythroxylon Coca* growing on the other side of the Andes. These leaves are chewed by the native Indians, as we use tobacco, a small pinch is wetted with saliva, and made into a ball with unslaked lime. The Indians who are capable of undergoing great fatigue, will, during the most strenuous exertion, subsist on one or two spoonfuls of maize flour mixed with water, daily, and their coca. The use of this plant has become as much an abuse amongst them, as opium-smoking in China. Its effect is to deaden sensation, and produce even madness; it has, morally, a most pernicious influence on those who take it in excess.

The Matico, or Matica, so highly esteemed in Peru, Dr. Martius believes to be a species of *Phlomis*. The tree grows in the interior of Peru, also on the other side of the Andes. Its leaves are said to possess marvellous medicinal properties. The preparation for use amongst the Indians is very simple, the leaf is dried and finely powdered, and the dust, sprinkled on wounds, is said to effect cicatrization very speedily. The Indians use an infusion of the fresh leaves as an aphrodisiac, and attribute to them the power of arresting arterial hæmorrhage, even if a large vessel be wounded.

Ibid, from Gauger's Rept., 1842.

On Menyanthin. By BRANDES.—The presence of coloring matter, sugar, and organic substances, soluble in alcohol, and the decomposition by heat, are the chief difficulties to contend with in the preparation of menyanthin. The following method will be found to be the most ad-

vantageous:—an alcoholic extract is to be prepared from the juice of the plant by maceration; the spirit is to be distilled off; the aqueous residue to be filtered and fermented with yeast, to remove the sugar; and to each pound of the herb, two ounces of an aqueous solution of oxide of lead are to be added. This will assume a yellow color, and the fluid will appear but slightly yellow, with a greenish tint. Filter; remove the excess of lead; refilter and evaporate, by gentle heat (under 60° .) to the consistence of an extract. This extract is to be covered with alcohol, of ninety-five per cent., and to stand for two or three days; the brownish yellow solution is to be separated, and mixed with animal charcoal, filtered, and the spirit removed by evaporation over sulphuric acid, as distillation causes a discoloration. The yellow, pale, syrup-like mass thus obtained, is easily dissolved in water; and on the addition of more water, a separation of a few oily resinous drops ensues, which are to be removed, and the solution evaporated *in vacuo*; thus a white mass is obtained—partly crystalline, partly amorphous. Menyanthin has a bitter taste, readily becomes brown by heating with an absorption of oxygen, and is decomposed by heat, like all vegetable bitters. It is soluble in alcohol, alcoholic æther, and water, but not in pure æther. An aqueous solution is rendered turbid by alkalies, owing to the presence of salts of lime; it undergoes no change with ammonia, chloride of barium, and acetate of lead. With chloride of tin and tincture of galls it is rendered slightly turbid. With chloride of platina it forms a yellowish precipitate; with the salts of mercury and sulphate of copper a white, and with sulphate of iron a yellowish precipitate; the latter is sulphate of lime. Menyanthin, therefore, forms no combination with metallic oxides. *Ibid, from Arch. der Pharm.*

Benzoic Acid in Elecampane.—Rœttscher has found in a vessel that had contained an alcoholic extract of the Rad. Inulæ, also on the cover of the vessel in which it had stood, pointed crystals of benzoic acid.

Ibid.

Preparation of Churrus, or Resinous Extract of Indian Hemp.—In Central India, and the Saugor territory, and in Nipal, *churrus* is collected during the hot season in the following singular manner:—Men, clad in leathern dresses, run through the hemp-fields, brushing through the plant with all possible violence; the soft resin adheres to the leather, and is subsequently scraped off, and kneaded into balls, which sell at

from five to six rupees the seer. A still finer kind, the *momeea* or waxen *churrus*, is collected by the hand in Nipal, and sells for nearly double the price of the ordinary kind. In Nipal, Dr. M'Kinnon informs us, the leathern attire is dispensed with, and the resin is ga'hered on the skins of naked coolies. In Persia, it is stated by Mirza Abdul Russac, that the *churrus* is prepared by pressing the resinous plant on coarse cloths, and then scraping it from these and melting it in a pot with a little warm-water. He considers the *churrus* of Herat as the best and most powerful of all the varieties of the drug.

Ibid, from O'Shaughnessy's Bengal Dispensatory.

Citrate, or Ammonio-Citrate of Iron. By Mr. A. J. COOLEY.—Competition in the sale of this article has induced the manufacturer to adopt a cheaper formula than that originally published by Beral, and employed by many houses. It is now frequently prepared by placing together, for some days, in a warm situation, a mixture of iron filings, and citric acid in powder, with barely sufficient water to cover them, occasionally stirring and replacing the water as it evaporates. A saturated solution is made in distilled water, there being previously added more *citric acid*,* if required; it is then neutralised with *liq. ammon. fort.*,† and concentrated by evaporation: the same plan mentioned at page 214, Vol. III., First Series, is followed to complete the process. The first part of this process produces a salt of the protoxide of iron, which is afterwards converted, by the exposure to the atmosphere, into a citrate of the magnetic oxide, and lastly into citrate of peroxide of iron.

The Chemist.

Liquor Ferri Potassio-Citratis. By Dr. JOHN TODD.

R. Acid. citric. crystallizat., ℥j. 3v.;
 Potassæ carbonatis, ʒvij;
 Ferri sesquioxidi, ℥j;
 Sp. ammoniæ aromat., q. s.;
 Aquæ distillat., ℥xxiv.

Dissolve the acid, citric. and potass. carb. in the water; when the effervescence has ceased, add the ferri sesquioxidi, and digest for

* About half the weight of the acid first used.

† About one ounce and a quarter to every gallon of the solution of a specific gravity of 1.025.

twenty-four hours (frequently stirring) in a gentle heat; filter the liquid, and neutralise any excess of acid by dropping in, gradually, sp. ammon. arom., until it is saturated. The liquid is of a reddish brown color, not precipitated by alkalies, nor altered in color by the ferrocyanide of potassium, or tincture of galls. The taste is slightly styptic, though not unpleasant. It will be seen that there are two equivalents of acid. citric. combined with one equivalent of potassa, and one equivalent of the ferri sesquioxys. — One drachm of this solution contains five grains of the dry ferri potassio-citras.

An agreeable syrup may be made by dissolving sacchar. alt., lb. j. in f $\overline{3}$ xviiij. of the solution, and liquifying by a gentle heat. We have thus f $\overline{3}$ xviiij. of syrup; consequently f $\overline{3}$ j. will contain 2.25 grains.—*Ibid.*

*Ointment for Affections of the Nipples.** By M. RIGHINI.

R. Simple ointment	24 grammes.
White-lead ointment	8 grammes.
Deutoxide of lead	2 grammes.
Peroxide of mercury	6 decigr.
Deutosulphuret of mercury	3 decigr.

F. S. A. an ointment. A small quantity is rubbed with the finger on the diseased nipple.

When the nurse wishes to give suck, she should wash the nipple with slightly alkaline water, then with pure water. *Ibid.*

Five Specimens of Calomel. By Mr. ROBERT HOWARD.—*Specimen 1.* Calomel sublimed in glass.—This specimen is crystallised in masses; being parts of the cake formed on the inner surface of the glass receiver. It is perfectly colorless, except at the points of concussion where the cake has been broken.

Specimen 2. Calomel condensed by air.—This is crystalline, and nearly colorless.

Specimen 3. Calomel condensed by air.—This specimen is in the form of powder, but too coarse for medicinal use. It is perfectly white.

Specimen 4. Hydro-sublimed calomel, prepared by Howards and Kent's steam process.—This is in extremely fine powder, and perfectly white.

* Journal de Chimie Medicale.

Specimen 5. Calomel, as usually sold by Messrs. Howards and Kent, and having a slightly yellowish tinge.

Mr. Howard, in a letter which accompanied the specimens, observes, that

"Dr. Gardner's paper illustrates the difference which the mechanical state of a substance may produce in its medicinal effects. It is, however, quite a mistake to suppose that calomel is *necessarily* or *generally* in finer powder when white; it may be, and sometimes is, very coarse, and yet white, as the specimens which I send will serve to show.

"It is a curious fact, that the hydro-calomel, which is in a far more impalpable powder than any other, is objected to by some as not sufficiently active, except in increased doses, four grains being about equal to three, although it has been found to answer extremely well in many cases, more particularly in the diseases of children."

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